

PROJECT MANUAL

*Fire Station Expansion
Missouri State Fairgrounds
Sedalia, Missouri*

Designed By: PWAarchitects, Inc
2120 Forum Blvd, Ste 101
Columbia, MO 65201

Date Issued: September 19, 2025

Project No.: F2405-01

STATE *of* MISSOURI

OFFICE *of* ADMINISTRATION
Facilities Management, Design and Construction

SECTION 000107 - PROFESSIONAL SEALS AND CERTIFICATIONS

PROJECT NUMBER: F2405-01

THE FOLLOWING DESIGN PROFESSIONALS HAVE SIGNED AND SEALED THE ORIGINAL PLANS AND SPECIFICATIONS FOR THIS PROJECT, WHICH ARE ON FILE WITH THE DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION:

Architect:

PWArchitects, Inc.
Erik Miller, AIA, CDT
2120 Forum Blvd., Ste. 101
Columbia, Mo. 65203



Structural:

Crockett Engineering Consultants
Jared Verslues, PE
1000 W. Nifong., Bldg. 1
Columbia, Mo. 65203



Civil:

Crockett Engineering Consultants
Kyle Miller, PE
1000 W. Nifong., Bldg. 1
Columbia, Mo. 65203



Mechanical, Electrical, Plumbing:

J-Squared Engineering
James Watson, PE
2400 Bluff Creek Drive, STE 101
Columbia, Mo. 65201

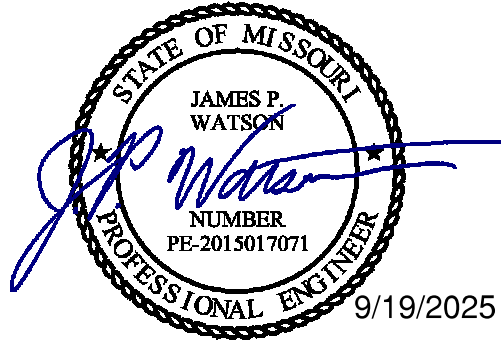


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NOTICE TO BIDDERS

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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LIST OF DRAWINGS**

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

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 LIST OF DRAWINGS

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

<u>TITLE</u>	<u>SHEET #</u>	<u>DATE</u>	<u>CAD #</u>
GENERAL			
Cover Sheet, Index of Drawings & Location Map	G-001	09/19/25	G-001
Code and Egress Plan	G-002	09/19/25	G-002
CIVIL			
Civil Cover Sheet	C-100	09/19/25	C-100
Civil Project Specifications	C-101	09/19/25	C-101
Demolition Plan	C-102	09/19/25	C-102
Erosion Control Plan	C-103	09/19/25	C-103
Grading Plan	C-104	09/19/25	C-104
Utility Plan	C-105	09/19/25	C-105
Storm Sewer Profile – Lines 1&2	C-106	09/19/25	C-106
Sanitary Sewer Profile – Line 1	C-107	09/19/25	C-107
Site Plan	C-108	09/19/25	C-108
Pavement Details	C-109	09/19/25	C-109
STRUCTURAL			
Cover/General Structural Data	S-100	09/19/25	S-100
Foundation Plans	S-200	09/19/25	S-200
Foundation Details	S-210	09/19/25	S-210
Roof Framing Plan	S-300	09/19/25	S-300
Shear Wall Plan	S-300A	09/19/25	S-300A
Roof Framing Details	S-310	09/19/25	S-310
Roof Framing Details	S-311	09/19/25	S-311

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ARCHITECTURAL			
Symbols, Abbreviations & Notes	A-001	09/19/25	A-001
Architectural Site Plan	A-100	09/19/25	A-100
First Floor Plans	A101	09/19/25	A-101
Second Floor Plans	A-102	09/19/25	A-102
Reflected Ceiling Plans	A-103	09/19/25	A-103
Roof Plan and Details	A-104	09/19/25	A-104
Finish Plan and Schedule	A-105	09/19/25	A-105
Exterior Elevations	A-201	09/19/25	A-201
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Interior Elevations	A-203	09/19/25	A-203
Building Sections and Details	A-301	09/19/25	A-301
Wall Sections & Details	A-302	09/19/25	A-302
Door & Window Schedules & Details	A-601	09/19/25	A-601
Door & Window Details	A-602	09/19/25	A-602
MEP			
MEP General Details	MEP-101	09/19/25	MEP-101
Site Utilities Plan	MEP-102	09/19/25	MEP-102
Temporary Electrical Plan	MEP-103	09/19/25	MEP-103
Roof Plan	MEP-104	09/19/25	MEP-104
HVAC Plan	M-101	09/19/25	M-101
HVAC Details	M-501	09/19/25	M-501
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HVAC Kitchen Ventilation Details 1	M-602	09/19/25	M-602
HVAC Kitchen Ventilation Details 2	M-603	09/19/25	M-603
HVAC Kitchen Ventilation Details 3	M-604	09/19/25	M-604
Power Plan	E-101	09/19/25	E-101
Lighting Plan	E-102	09/19/25	E-102
Electrical Details & Schedules 1	E-501	09/19/25	E-501
Electrical Details & Schedules 2	E-502	09/19/25	E-502
Electrical Details & Schedules 3	E-503	09/19/25	E-503
Fire Alarm Plan	F-101	09/19/25	F-101
Fire Sprinkler Plan	F-102	09/19/25	F-102
Sanitary Sewer Plan	P-101	09/19/25	P-101

Water & Gas Plan	P-102	09/19/25	P-102
Plumbing Details	P-501	09/19/25	P-501
Plumbing Schedules	P-601	09/19/25	P-601

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. Fire Station Expansion
Missouri State Fairgrounds
Sedalia, Missouri
Project No.: F2405-01

3.0 BIDS WILL BE RECEIVED:

- A. Until: 1:30 PM, October 21, 2025
- 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 the demolition of the existing building and the construction of a new wood frame structure. Building will house separate men's and women's sleeping spaces, offices, meeting spaces, and support space.
- B. MBE/WBE/SDVE Goals: MBE 10%, WBE 10%, and SDVE 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) meeting the requirements of Section 34.074, RSMo and 1 CSR 30-5.010, can be used to satisfy the MBE/WBE/SDVE participation goals for this project.**

5.0 PRE-BID MEETING:

- A. Place/Time: 10:00 AM, October 2, 2025, at Missouri State Fairgrounds boardroom, 2503 W 16th Street, Sedalia, MO 65301
- 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 \$100.00 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. Designer: PWArchitects, Inc, Erik Miller, 573.449.2683, email: emiller@pwarchitects.com
- B. Project Manager: Aaron Libbert, 816.797.3442, email: aaron.libbert@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 Designer and 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 Designer and 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 Compliance Evaluation Form
004338	MBE/WBE/SDVE Eligibility Determination for Joint Ventures
004339	MBE/WBE/SDVE GFE Determination
004340	SDVE 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 or 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 with your bid to FMDCBids@oa.mo.gov.
- D. All bids shall be submitted without additional terms and conditions, modifications, or reservations. The completed forms should 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 should 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 should 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 and bids received by the Owner 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. All revised bids must be submitted to FMDCBids@oa.mo.gov, revised bids sent any other way 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 a 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 - LIST OF SUBCONTRACTORS

- A. If required by “Section 004113 – Bid Form,” each Bidder must submit as part of their bid a list of subcontractors to be used in performing the work (Section 004336). The list must specify the name of the single designated subcontractor, manufacturer, or suppliers for each category of work listed in “Section 004336 - Proposed Subcontractors Form.” If work within a category will be performed by more than one subcontractor, the bidder must provide the name of each subcontractor and specify the exact portion of the work to be done by each. If the Bidder intends to perform any of the designated subcontract work with the use of his own employees, the Bidder shall make that fact clear, by listing his own firm for the subject category. **If any category of work is left vacant or if more than one subcontractor is listed for any category without designating the portion of work to be performed by each, the bid shall be rejected.**

12.0 - 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.

13.0 - 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.

14.0 – 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.

15.0 – MBE/WBE/SDVE INSTRUCTIONS

A. Definitions:

- 1. “**MBE**” means a Minority Business Enterprise.
- 2. “**MINORITY**” has the same meaning as set forth in 1 C.S.R. 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.

B. MBE/WBE/SDVE General Requirements:

- 1. For all bids greater than \$100,000, the Bidder shall obtain MBE, WBE and SDVE 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 and SDVE 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 Compliance Evaluation Form for every MBE, WBE, or SDVE subcontractor or material supplier the Bidder intends to use for the contract work. The Bidder is required to submit all MBE/WBE/SDVE 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, and/or SDVE 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 34.074, RSMo, a Prime Bidder that qualifies as an SDVE 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 by three percent of the apparent low responsive Bidder’s bid. Based on this calculation, if the eligible SDVE’s evaluation is less than the apparent low responsive Bidder’s bid, the eligible SDVE’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 preference, the Bidder must complete and submit with its bid the Missouri Service-Disabled Veteran Business Form, and any information required by the form.

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

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

a general contractor must obtain MBE and SDVE participation; and a SDVE 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 Compliance Evaluation Form (Section 004337) identifying itself as an MBE, WBE or SDVE.

2. The total dollar value of the work granted to a certified MBE, WBE or SDVE by the Bidder shall be counted towards the applicable goal.
3. Expenditures for materials and supplies obtained from a certified MBE, WBE, or SDVE supplier or manufacturer may be counted towards the MBE, WBE and SDVE goals, if the MBE, WBE, or SDVE 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 and SDVE goals, if the MBE, WBE, or SDVE 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, or SDVE partner in the joint venture may be counted towards the MBE/WBE/SDVE goals.
6. Only expenditures to a MBE, WBE, or SDVE that performs a commercially useful function in the work may be counted towards the MBE, WBE and SDVE goals. A MBE, WBE, or SDVE 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 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 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 subcontractor or supplier by referring to the Office of Equal Opportunity online SDVE directory at <https://o eo.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 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 Participation:

1. If a Bidder has made a good faith effort to secure the required MBE, WBE and/or SDVE participation and has failed, the Bidder shall submit with its bid the information requested in MBE/WBE/SDVE 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, and/or SDVE 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 and/or SDVE 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, and SDVE 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 firms contacted for specific categories of work;
- d. If project information, including plans and specifications, were provided to MBE/WBE/SDVE subcontractors;
- e. Whether the Bidder made any attempts to follow-up with MBE, WBE or SDVE 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 Obligations

- 1. If awarded a contract, the Bidder will be contractually required to subcontract with or obtain materials from the MBE, WBE, and SDVE 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, or SDVE during the course of the contract, the Contractor shall replace it with another MBE, WBE, or SDVE or make a good faith effort to do so. All MBE, WBE and SDVE 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 obligations. At a minimum, the Contractor shall report the dollar-value of work completed by each MBE, WBE, or SDVE during the preceding month and the cumulative total of work completed by each MBE, WBE or SDVE 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, and SDVE 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: Fire Station Expansion
Missouri State Fairgrounds
Sedalia, Missouri

Project Number: F2405-01

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 completion date is **June 30, 2026**. 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 \$1,500** 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.

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 10% MBE and 10% WBE and 3% SDVE participation goals. The Contractor agrees to secure the MBE/WBE/SDVE participation amounts for this project as follows: (OR)

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

MBE/WBE/SDVE Firm: Subcontract Amt:\$
MBE/WBE/SDVE Firm: Subcontract Amt:\$
MBE/WBE/SDVE Firm: Subcontract Amt:\$

Total \$

MBE/WBE/SDVE 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 firms listed above when such disputes impact the subcontract amounts shown above.

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. Unit Prices (Section 004322)
 - iii. Proposed Contractors Form (Section 004336)
 - iv. MBE, WBE, SDVE Compliance Evaluation Form(s) (Section 004337)
 - v. MBE, WBE, SDVE Eligibility Determination Form for Joint Ventures (Section 004338)
 - vi. MBE, WBE, SDVE Good Faith Effort (GFE) Determination Form (Section 004339)
 - vii. Missouri Service Disabled Veteran Business Form (Section 004340)
 - viii. 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:

Brian Yansen, 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

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	DATE INSTALLED
LOCATION		

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



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

MBE/WBE/SDVE PROGRESS REPORT

Remit with **ALL** Progress and Final Payments

(Please check appropriate box) CONSULTANT CONSTRUCTION

PAY APP NO.	PROJECT NUMBER
CHECK IF FINAL <input checked="" type="checkbox"/> FINAL	DATE

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 PARTICIPATION DOLLAR AMOUNT OF THIS PROJECT AS INDICATED IN THE ORIGINAL CONTRACT: \$			
SELECT MBE, WBE, SDVE	ORIGINAL CONTRACT PARTICIPATION AMOUNT	PARTICIPATION AMOUNT PAID-TO-DATE (includes approved contract changes)	CONSULTANT/SUBCONSULTANT OR CONTRACTOR/SUBCONTRACTOR/SUPPLIER COMPANY NAME
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	

Revised 06/2023

INSTRUCTIONS FOR MBE/WBE/SDVE PROGRESS REPORT

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

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

FILE: Closeout Documents

GENERAL CONDITIONS

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SECTION 007213 - GENERAL CONDITIONS

- 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 plate 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 without 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, 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 contract 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 0, BIDDING AND CONTRACTING REQUIREMENTS.

2.0 CONTACTS:

Designer: Erik Miller
PWArchitects, Inc
2120 Forum Blvd, Ste 101
Columbia, MO 65201
Telephone: 573.449.2683
Email: emiller@pwarchitects.com

Construction Representative: Dustin Cooper
Division of Facilities Management, Design and Construction
301 W Highs St, ste 730
Jefferson City, MO 65109
Telephone: 573.536.1692
Email: dustin.cooper@oa.mo.gov

Project Manager: Aaron Libbert
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, Missouri 65101
Telephone: 816.797.3442
Email: aaron.libbert@oa.mo.gov

Contract Specialist: April Howser
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, Missouri 65101
Telephone: 573.751.0053
Email: april.howser@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.

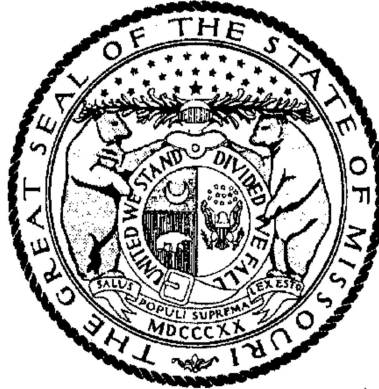
5.0 SAFETY REQUIREMENTS

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. 32

Section 080
PETTIS 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, 2025**

Last Date Objections May Be Filed: **April 9, 2025**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	\$72.21
Boilermaker	\$27.82*
Bricklayer-Stone Mason	\$56.32
Carpenter	\$55.57
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	\$55.20
Plasterer	
Communication Technician	\$27.82*
Electrician (Inside Wireman)	\$74.00
Electrician Outside Lineman	\$27.82*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	\$27.82*
Glazier	\$43.38
Ironworker	\$72.47
Laborer	\$52.89
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	\$27.82*
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	\$69.66
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	\$47.31
Plumber	\$80.97
Pipe Fitter	
Roofer	\$61.09
Sheet Metal Worker	\$73.43
Sprinkler Fitter	\$69.03
Truck Driver	\$27.82*
Truck Control Service Driver	
Group I	
Group II	
Group III	
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.

Heavy Construction Rates for
PETTIS County

Section 080

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	\$27.82*
Millwright	
Pile Driver	
Electrician (Outside Lineman)	\$27.82*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	\$50.21
General Laborer	
Skilled Laborer	
Operating Engineer	\$59.26
Group I	
Group II	
Group III	
Group IV	
Truck Driver	\$27.82*
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance with 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 as 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 Fire Station Training facility to be located at the Missouri State Fairgrounds. The building consists of garage space, meeting spaces, offices, kitchen, sleeping rooms, administrative spaces, storage spaces and mechanical spaces.
 - 1. Project Location: Missouri State Fairgrounds, 2503 W. 16th St., Sedalia, Mo.
 - 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 August 7, 2025 were prepared for the Project by PWAarchitects, Inc, 2120 Forum Blvd., Ste. 101, Columbia, Mo. 65203.
- C. The Work consists of: The full demolition of the existing building and paving with partial demolition of existing on site utilities. A new wood frame building with either a composition shingle roof or standing seam metal roof. The building will house separate men's and women's sleeping rooms, toilet rooms with showers, meeting spaces, offices and support spaces. Site work will include new concrete aprons, sidewalks and utilities.
 - 1. The Work includes:
 - 1) Concrete – Site paving, shallow footing, and slab-on-grade.
 - 2) Brick masonry veneer.
 - 3) Wood roof trusses.
 - 4) Sheathing and siding.
 - 5) Roofing – Composition shingles and Standing seam metal roofing.
 - 6) Associated flashing(s).
 - 7) Doors and Door Hardware.
 - 8) Interior Finishes.
 - 9) Toilet partitions/accessories.
 - 10) Showers.
 - 11) Kitchen equipment.
 - 12) Plumbing.
 - 13) Ventilation.
 - 14) Electrical.
 - 15) Site restoration.
- D. The Work will be constructed under a single prime contract.

1.3 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.

1.4 OCCUPANCY REQUIREMENTS

- A. Full Owner Occupancy: 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.

1.5 OWNER-FURNISHED PRODUCTS

- A. The Owner will furnish toilet accessories as noted on the Project Drawings. 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.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 011000

SECTION 012200 – UNIT PRICES

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 for Unit Prices.
- B. Related Sections include the following:
 - 1. Division 1 Section "Allowances" for procedures for using Unit Prices to adjust quantity allowances.
 - 2. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 - 3. Division Section **31 2000 EARTH MOVING** for procedures for measurement and payment for Unsuitable Materials or Mass Rock Removal and Replacement.

1.3 DEFINITIONS

- A. Unit Price is a price per unit of measurement for materials or services **ADDED TO** or **DEDUCTED FROM** the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit Prices include all necessary material plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of Unit Prices. Methods of measurement and payment for Unit Prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of Work in-place that involves use of established Unit Prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A list of Unit Prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each Unit Price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

- A. Unit Price No. 1 – Unsuitable Subgrade Excavation and Replacement:
 - 1. Description: Unsuitable Subgrade Excavation above quantities shown on the drawings according to Division 31 Section **31 2000 EARTH MOVING**.
 - 2. Unit of Measurement: Cubic Yard (CY).
 - 3. Base Bid Quantity: 25 cubic yards.

- B. Unit Price No. 2 – Mass Rock Removal and Replacement:
 - 1. Description: Unsuitable Subgrade Excavation above quantities shown on the drawings according to Division 31 Section **31 2000 EARTH MOVING**.
 - 2. Unit of Measurement: Cubic Yard (CY).
 - 3. Base Bid Quantity: 10 cubic yards.

END OF SECTION 012200

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 workdays 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 1 – Add the Area Indicated as Bunk 7 to the Enclosed area of the building:

1. Extend Foundations and exterior walls and roofing of the building to enclose the area designated as Bunk 7. Include doors, windows, wall, floor and ceiling finishes. Include HVAC units for the rooms as part of this alternate.
2. Base Bid: Base Plan not including the area for Bunk 7. Interior walls adjacent will be finished as exterior walls. Entry Door into Bunk 7 space and windows into the space will be eliminated from that shown.

B. Alternate 2 – Fiber Cement Siding and Associated Trim:

1. Provide fiber cement siding and trim for exterior siding where siding and associated flashing is shown.
2. Base Bid: Metal Siding with associated flashing and trim.

C. Alternate 1 - Standing Seam Metal Roofing System:

1. Provide standing seam metal roof and associated flashing changes where shingle roofing is shown.
2. Base Bid: To include composition shingle roof system as indicated.

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 012200 "Unit Prices" for administrative requirements for using Unit Prices.
 - 3. Division 1, Section 013115 "Project Management Communications" for administrative requirements for communications.
 - 4. Division 0, Section 007213, Article 3.1 "Acceptable Substitutions" for administrative procedures for handling Requests for Substitutions made after Contract award.
 - 5. 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 Contractor 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 "Schedules" 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) workdays 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, E-Builder[®] 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 E-Builder[®] as provided by "e-Builder[®]" 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: E-Builder[®] 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 files, processes or design information distributed in this system is intended only for the project specified herein.
- D. Purpose: The intent of using E-Builder[®] 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 E-Builder 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 E-Builder® 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 party's 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 E-Builder® web site by licensed users.

- a. The Owner and his representatives, the Designer and his consultants, and the Contractor and his Sub Contractors 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 Sub Contractors 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 Sub Contractors 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 user's normal work location¹ 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 system² 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 E-Builder® 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. 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.
 - 3. 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.
 - 4. 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.

SPEC SECTION	TITLE	CATEGORY
013200	Schedules	Construction Schedule
013200	Schedules	Schedule of Values
013200	Schedules	List of Subcontractors
013200	Schedules	Major Material Suppliers
013300	Submittals	As-Builts
033000	Cast-in-Place Concrete	Product Data
033000	Cast-in-Place Concrete	Certification
033000	Cast-in-Place Concrete	Test Report
042200	Concrete Unit Masonry	Shop Drawings
042200	Concrete Unit Masonry	Product Data
042200	Concrete Unit Masonry	Sample
042200	Concrete Unit Masonry	Certification
042200	Concrete Unit Masonry	Test Report
061000	Rough Carpentry	Product Data
061000	Rough Carpentry	Certification
061000	Rough Carpentry	Test Report
061600	Sheathing	Product Data
061753	Shop-Fabricated Wood Trusses	Shop Drawings
061753	Shop-Fabricated Wood Trusses	Product Data
061753	Shop-Fabricated Wood Trusses	Certification
061753	Shop-Fabricated Wood Trusses	Test Report
073113	Asphalt Shingles	Product Data
073113	Asphalt Shingles	Sample
073113	Asphalt Shingles	Certification
073113	Asphalt Shingles	Warranty
074113	ALT. 2: Metal Roof Panels	Shop Drawings
074113	ALT. 2: Metal Roof Panels	Product Data
074113	ALT. 2: Metal Roof Panels	Sample
074113	ALT. 2: Metal Roof Panels	Warranty
074646	Fiber Cement Siding	Product Data
074646	Fiber Cement Siding	Warranty

076200	Sheet Metal Flashing and Trim	Shop Drawings
076200	Sheet Metal Flashing and Trim	Sample
079200	Joint Sealants	Product Data
079200	Joint Sealants	Sample
081113	H.M. Doors and Frames	Shop Drawings
081113	H.M. Doors and Frames	Product Data
087100	Door Hardware	Shop Drawings
087100	Door Hardware	Product Data
087100	Door Hardware	Operation / Maintenance Manual
089100	Louvers and Foundation Vents	Product Data
092116	Gypsum Board Assemblies	Product Data
099000	Painting and Coating	Product Data
099000	Painting and Coating	Sample
099000	Painting and Coating	Certification
099000	Painting and Coating	Operation / Maintenance Manual
101400	Signage	Product Data
101400	Signage	Sample
102113.19	Plastic Toilet Compartments	Shop Drawings
102113.19	Plastic Toilet Compartments	Product Data
102800	ALT. 1: Toilet Accessories	Product Data
224000	Plumbing Fixtures	Product Data
233416	Centrifugal HVAC Fans	Product Data
262416	Panelboards	Product Data
262726	Wiring Devices	Product Data
265100	Interior Lighting	Shop Drawings
265100	Interior Lighting	Product Data
265600	Exterior Lighting	Shop Drawings
265600	Exterior Lighting	Product Data
311000	Site Clearing & Demolition	Product Data
312000	Earth Moving	Product Data
312000	Earth Moving	Sample
312000	Earth Moving	Certification
312000	Earth Moving	Test Report
321313	Concrete Pavement	Product Data
321313	Concrete Pavement	Test Report
321373	Concrete Paving Joint Sealants	Product Data
321373	Concrete Paving Joint Sealants	Certification
331113	Facility Water Distribution Piping	Product Data
331113	Facility Water Distribution Piping	Test Report
331113	Facility Water Distribution Piping	Operation / Maintenance Manual
333000	Sanitary Sewage Utilities	Shop Drawings

END OF SECTION 013300

SECTION 013513.28 – SITE SECURITY AND HEALTH REQUIREMENTS

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 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. 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.

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. All construction personnel shall visibly display issued identification cards.

3.2 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. Alcoholic beverages or illegal substances shall not be brought upon the Facility premises. The Contractor's workers shall not be under the influence of any intoxicating substances while on the Facility premises.

3.3 SECURITY CLEARANCES AND RESTRICTIONS

A. FMDC REQUIRED FINGERPRINTING FOR CRIMINAL BACKGROUND AND WARRANTS CHECK

- 1. All employees of the Contractor are required to submit fingerprints to the Missouri State Highway Patrol to enable the Office of Administration, Division of Facilities Management, Design and Construction (FMDC) to receive state and national criminal background checks on such employees. FMDC reserves the right to prohibit any employee of the Contractor from performing work in or on the premises of any facility owned, operated, or utilized by the State of Missouri for any reason.
- 2. The Contractor shall ensure all of its employees submit fingerprints to the Missouri State Highway Patrol and pay for the cost of such background checks. The Contractor shall submit to FMDC via email to FMDCSecurity@oa.mo.gov a list of the names of the Contractor's employees who will be fingerprinted and a signed Missouri Applicant Fingerprint Privacy Notice, Applicant Privacy Rights and Privacy Act Statement for each employee. All employees of the Contractor approved by FMDC to work at a State facility must obtain a contractor ID badge from FMDC prior to beginning work on-site, unless the Director of FMDC, at the Director's discretion, waives the requirement for a contractor ID badge. The Contractor and its employees must comply with the process for background checks

and contractor ID badges found on FMDC's website at: <https://oa.mo.gov/fmdc-contractor-id-badges>.

3. Pursuant to section 43.540, RSMo, FMDC participates in the Missouri Rap Back and National Rap Back programs as of August 28, 2018. This means that the Missouri State Highway Patrol, Central Records Repository, and the Federal Bureau of Investigation will retain the fingerprints submitted by each of the Contractor's employees, and those fingerprints will be searched against other fingerprints on file, including latent fingerprints. While retained, an employee's fingerprints may continue to be compared against other fingerprints submitted or retained by the Federal Bureau of Investigation, including latent fingerprints.
4. As part of the Missouri and National Rap Back programs, FMDC will receive notification if a new arrest is reported for an employee whose fingerprints have been submitted for FMDC after August 28, 2018. If the employee is performing work on a State contract at the time of the arrest notification, FMDC will request and receive the employee's updated criminal history records. If the employee is no longer performing work on a State contract, FMDC will not obtain updated criminal records.
5. Pursuant to section 43.540, RSMo, the Missouri State Highway Patrol will provide the results of the employee's background check directly to FMDC. FMDC may NOT release the results of a background check to the Contractor or provide the Contractor any information obtained from a background check, either verbally or in writing. FMDC will notify the Contractor only whether an employee is approved to work on State property.
6. Each employee who submits fingerprints to the Missouri State Highway Patrol has a right to obtain a copy of the results of his or her background check. The employee may challenge the accuracy and completeness of the information contained in a background check report and obtain a determination from the Missouri State Highway Patrol and/or the FBI regarding the validity of such challenge prior to FMDC making a final decision about his or her eligibility to perform work under a State contract.
7. The Contractor shall notify FMDC via email to FMDCSecurity@oa.mo.gov if an employee is terminated or resigns from employment with the Contractor. If the Contractor does not anticipate performing work on a State contract in the future, the Contractor may request that FMDC remove its employees from the Rap Back programs. However, if removed from the Rap Back programs, employees will be required to submit new fingerprints should the contractor be awarded another State contract.
8. Upon award of a Contract, the Contractor should contact FMDC at FMDCSecurity@oa.mo.gov to determine if its employees need to provide a new background check. If a Contractor's employee has previously submitted a fingerprint background check to FMDC as part of the Missouri and National Rap Back programs, the employee may not need to submit another fingerprint search for a period of three to six years, depending upon the circumstances. The Contractor understands and agrees that FMDC may require more frequent background checks without providing any explanation to the Contractor. The fact that an additional background check is requested by FMDC does not indicate that the employee has a criminal record.

3.4 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.

END OF SECTION 013513.28

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. Dewatering facilities and drains
 - 3. Temporary enclosures
 - 4. Hoists
 - 5. Waste disposal services
 - 6. 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. 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.
- C. Water: Provide potable water approved by local health authorities.
- D. 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. Temporary Water Service: The Owner will provide water for construction purposes from the existing building system. All required temporary extensions shall be provided and removed by the Contractor. Connection points and methods of connection shall be designated and approved by the Construction Representative.
- B. Temporary Electric Power Service: The Owner will provide electric power for construction lighting and power tools. Contractors using such services shall pay all costs of temporary services, circuits, outlet, extensions, etc.
- C. 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.
- D. 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.
- E. Temporary Telephones: Provide temporary telephone service throughout the construction period for all personnel engaged in construction activities.
- F. 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 toilet tissue materials for each facility.
- G. 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.

- H. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled-water drinking-water units, including paper supply.
- I. 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.
- C. Storage Facilities: The Owner will provide storage onsite as designated by the Facility Representative or the Construction Representative. Areas for use by the Contractor for storage will be identified at the Pre-Bid Meeting.
- D. Construction Parking: Parking at the site will be provided in the areas designated at the Pre-Construction Meeting.
- E. 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.
- F. 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.
- G. 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.

- H. **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.

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. **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.
- D. **Enclosure Fence:** Before excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.
 - 1. Provide open-mesh, chainlink fencing with posts set in a compacted mixture of gravel and earth.
- 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 impeding 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 jobsite.
 - 4. Provide adequate storage for all items awaiting removal from the jobsite, 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 onsite. 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 02 1413
SELECTIVE SITE DEMOLITION**

PART 1 - GENERAL

1.1 SUMMARY

- A. Remove and dispose of landscaping by methods permissible in the jurisdiction of the work.
- B. Remove and replacement of pavement as required to repair steam manhole.
- C. It is the intent that the demolition be complete and adequate for the intended purpose. This work shall include the removal of all items, whether in view or hidden underneath the surface of the ground, regardless of whether shown on the drawings or encountered during construction.

1.2 PERMITS

- A. Contractor shall comply with all applicable local, state, and federal requirements regarding materials, methods of work, and disposal of excess waste materials.

1.3 SUBMITTALS

- A. The contractor shall submit demolition and clearing procedures and operational sequences and schedules for review and acceptance by the Owner's representative.

1.4 GENERAL PROCEDURES

- A. Erect barriers to protect personnel, structures and utilities remaining intact.
- B. Protect on-site trees and plants noted on drawings. All neighboring landscaping and trees are to be protected from damage.
- C. Protect all existing objects intended to remain. In case of damage, make repairs or replacements necessary at no additional cost to the owner.
- D. Minimize interference with roads, streets, driveways, sidewalks, and adjacent facilities.
- E. Do not close or obstruct streets, sidewalks, alleys or passageways without permission from authorities having jurisdiction.
- F. If closure is permitted, provide signage indicating closure and signage to direct traffic to alternate route.
- G. Moisten surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other work on the site.

PART 2 EXECUTION

2.1 PREPERATION

- A. Notification: Provide the owner's representative a minimum of two business days' notice prior to commencing work of this section.
- B. The contractor shall locate existing utility lines and services traversing the site and determine the requirements for their protection. The contractor shall preserve active utilities on the site that are designated to remain.

- C. Before starting site operations, the contractor shall disconnect or arrange for the disconnection of all utility services designated to be removed. The contractor shall perform all such work in accordance with the requirements of the utility company or agency involved

2.2 PAVEMENTS

- A. In removing pavement, curb and gutter, sidewalks, etc., where a portion is left in place, removal shall be to an existing joint or to a joint sawed to a minimum depth of 2" with a true saw line and a vertical face. Remove sufficient pavement to provide for proper grade and connections in the new work regardless of any limits indicated on the drawing.

2.3 SEWERS

- A. Existing castings and culverts, if salvageable and removed intact, remain the property of the contractor.
- B. All sewers and drainage pipes, which have been or are to be abandoned, shall be permanently sealed at the ends with bulkheads constructed of concrete, having a minimum thickness of 8".
- C. Abandon storm or sanitary sewer structures by breaking the concrete bottom of the structure into pieces no larger than 12" in any direction and removing the top of the structure to 3" below finished grade. Plug all pipes with concrete and fill structure with 1" clean gravel.

2.4 DISPOSAL

- A. All debris shall be disposed of off-site
- B. Do not store or burn materials on-site unless permitted by the governing jurisdiction.
- C. All asphalt or concrete materials shall be disposed of off-site.
- D. Material acquired through demolition, other than those required to complete the construction project and designated for return to owner, will become the property of the contractor and will be removed from the site and off University property. The material will be disposed of in a legal manner.

2.5 CONSTRUCTION LIMITS

- A. The Contractor's operations shall be restricted to those areas inside the construction limits indicated on the drawings. If limits are not indicated, restrict work to the owner's property, easement, or public rights-of-way.
- B. Complete work within public rights-of-way under the permission of the governing agency.
- C. The contractor shall repair damage outside the construction limits at no additional expense to the owner.

2.6 UTILITY ADJUSTMENT

- A. The contractor is responsible for the adjustment of all gas vents, manholes, castings, and water valves within the grading limits to match the finished surface.
- B. Adjustments shall be coordinated with the utility companies and the cost for all adjustments shall be incidental to construction unless noted as a bid item.
- C. The contractor shall repair any damage to utility structures and appurtenances that occurs during construction at no additional cost to the owner.

END OF SECTION 02 1413

**SECTION 02 4100
DEMOLITION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Building demolition excluding removal of hazardous materials and toxic substances.
- B. Selective demolition of built site elements.
- C. Selective demolition of building elements for alteration purposes.
- D. Abandonment and removal of existing utilities and utility structures.

1.02 DEFINITIONS

- A. Demolish: Dismantle, raze, destroy, or wreck any building or structure or any part thereof.
- B. Remove: Detach or dismantle items from existing construction and dispose of them off site, unless items are indicated to be salvaged or reinstalled.
- C. Remove and Salvage: Detach or dismantle items from existing construction in a manner to prevent damage. Clean, package, label and deliver salvaged items to Owner in ready-for-reuse condition.
- D. Remove and Reinstall: Detach or dismantle items from existing construction in a manner to prevent damage. Clean and prepare for reuse and reinstall where indicated.
- E. Existing to Remain: Designation for existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.03 SUBMITTALS

- A. See Division 1 for submittal procedures.
- B. Site Plan: Indicate:
 - 1. Areas for temporary construction and field offices.
- C. Demolition Plan: Submit demolition plan as required by OSHA and local AHJs.
 - 1. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
 - 2. Demolition firm qualifications.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 3 EXECUTION

2.01 DEMOLITION

- A. Remove the entire building, paving and utilities as designated on the drawings and as required to complete the new work.
- B. Remove paving and curbs required to accomplish new work.
- C. Remove all other paving and curbs within site boundaries.
- D. Break up paving within site boundaries to permit natural moisture drainage; leave pieces not larger than 1 square yard.
- E. Within area of new construction, remove foundation walls and footings to minimum 3 feet below finished grade.
- F. Outside area of new construction, remove foundation walls and footings to minimum 3 feet below finished grade.
- G. Remove concrete slabs on grade within site boundaries.
- H. Remove manholes and manhole covers, curb inlets and catch basins.
- I. Remove fences and gates.
- J. Remove creosote-treated wood utility poles.
- K. Remove other items indicated, for salvage, relocation, and recycling.
- L. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 2000.

2.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Use of explosives is not permitted.
 - 3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 4. Provide, erect, and maintain temporary barriers and security devices.
 - 5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 7. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.

8. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
 9. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner.
 - C. Do not begin removal until built elements to be salvaged or relocated have been removed.
 - D. Protect existing structures and other elements to remain in place and not removed.
 1. Provide bracing and shoring.
 2. Prevent movement or settlement of adjacent structures.
 3. Stop work immediately if adjacent structures appear to be in danger.
 - E. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
 - F. Hazardous Materials:
 1. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.
 - G. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

2.03 EXISTING UTILITIES

- A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone. Identify and mark, in same manner as other utilities to remain, utilities to be reconnected.

2.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
 - 1. Verify construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Remove existing work as indicated and required to accomplish new work.
 - 1. Remove items indicated on drawings.
- C. Services including, but not limited to, HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
 - 1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - 3. Verify that abandoned services serve only abandoned facilities before removal.
 - 4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.
- D. Protect existing work to remain.
 - 1. Prevent movement of structure. Provide shoring and bracing as required.
 - 2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
 - 4. Patch to match new work.

2.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 02 4100

**SECTION 04 0511
MORTAR AND MASONRY GROUT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mortar for masonry.
- B. Grout for masonry.
- C. Grout for parge coat over split-face masonry veneer at waterproofing applications.

1.02 SUBMITTALS

- A. See Division One for submittal procedures.
- B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.
- C. Samples: Submit two samples of mortar, illustrating mortar color and color range.
- D. Reports: Submit reports on mortar indicating compliance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Manufacturer's Installation Instructions: Submit packaged dry mortar manufacturer's installation instructions.

1.03 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
 - 1. Maintain one copy of each document on project site.
- B. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of Contract Documents.

1.04 PRECONSTRUCTION TESTING

- A. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
 - 1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.06 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.
- B. Maintain materials and surrounding air temperature to minimum 40 degrees F (5 degrees C) prior to, during, and 48 hours after completion of masonry work.
- C. Maintain materials and surrounding air temperature to maximum 90 degrees F (32 degrees C) prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS

- A. At Contractor's option, mortar and grout 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.
 - 1. Refer to drawings for specific Mortar Colors and where they shall be installed.
- C. Mortar Mix Designs: ASTM C270, Property Specification.
 - 1. Exterior Masonry Veneer: Type N above grade, Type S below grade and in contact with earth.
 - 2. Refer to Structural Engineering drawings for additional information and requirements regarding Structural Load-Bearing masonry.

2.02 MATERIALS

- A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Type: Type N.
 - 2. Color: Mineral pigments added as required to produce approved color sample.
- B. Portland Cement: ASTM C150/C150M.
 - 1. Type: Type I - Normal; ASTM C150/C150M.
- C. Masonry Cement: ASTM C91/C91M.
 - 1. Type: Type N; ASTM C91/C91M.
- D. Hydrated Lime: ASTM C207, Type S.
- E. Quicklime: ASTM C5, non-hydraulic type.
- F. Mortar Aggregate: ASTM C144.
- G. Additives:

1. **Filled and Polished Ground Face Concrete Block Veneer, Product-Specific Mortar Requirements: Mortar shall include manufacturer approved compatible integral water repellent additive added to each batch in the dosage rates for mortar type specified.**
- H. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
 1. Color(s): As indicated on drawings.
 2. Manufacturers:
 - a. Davis Colors; www.daviscolors.com.
 - b. Lambert Corporation; www.lambertusa.com.
 - c. Solomon Colors; Solomon Colors Concentrated A, H, and X Series: www.solomoncolors.com.
 - d. Substitutions: See Division One.
- I. Water: Clean and potable.
- J. Bonding Agent: Latex type.

2.03 MORTAR MIXING

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio; mix in accordance with manufacturer's instructions, uniform in coloration.
- D. Do not use anti-freeze compounds to lower the freezing point of mortar.
- E. If water is lost by evaporation, re-temper only within two hours of mixing.

PART 3 EXECUTION

3.01 PREPARATION

- A. Apply bonding agent to existing concrete surfaces.
- B. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

3.02 INSTALLATION

- A. Install mortar to requirements of section(s) in which masonry is specified.
- B. Remove excess mortar from grout spaces.

3.03 FIELD QUALITY CONTROL

- A. Test and evaluate mortar in accordance with ASTM C780 procedures.

END OF SECTION 04 0511

**SECTION 04 2000
UNIT MASONRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Clay facing brick.
- B. Mortar and grout.
- C. Reinforcement and anchorage.
- D. Flashings.
- E. Lintels.
- F. Accessories.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.03 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops indicated net-area compressive strengths (f'm) at 28 days.
- B. Determine net-area compressive strength (f'm) of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.04 SUBMITTALS

- A. See Division One for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
- C. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.
 - 1. Include calculations or selections from the manufacturer's prescriptive design tables that indicate compliance with the applicable building code and project conditions.
 - 2. Include the design engineer's stamp or seal on each sheet of shop drawings.
 - 3. Include the seal and signature on each sheet of shop drawings of a Professional Engineer registered in the State of Missouri.
 - 4. Include bracing/shoring diagrams signed and sealed by a Professional Engineer registered in the State of Missouri as required to meet OSHA requirements.
 - 5. Stainless Steel Drip Flashings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashing terminations, and installation details.

6. Include elevations of reinforced walls indicating embedded items and proposed expansion joints locations.
- D. Samples: Submit four samples of facing brick units to illustrate color, texture, and extremes of color range.
- E. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
- F. Designer's Qualification Statement.
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.
- I. Manufacturer's written and approved installation instructions of all products.
- J. Mix Designs: For each type of mortar and grout, include description of type and proportions of ingredients.
 1. Include test reports per ASTM C780 for mortar mixes required to comply with property specification.
 2. Include test reports per ASTM C1019 for grout mixes required to comply with compressive strength requirement.
 3. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
 4. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements for masonry installed when ambient air temperature is less than 40° F or temperature is expected to drop below 32° F within 24 hours.
 5. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE6.
- K. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Division One for additional provisions.
 2. Extra Clay Facing Brick Units: 50 of each type, size, texture, and color combination.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, and ACI 530/530.1/ERTA, except where exceeded by requirements of Contract Documents.
 1. Maintain one copy of each document on project site.
- B. Fire Rated Assemblies: Comply with applicable code for UL Assemblies indicated on drawings.
- C. Comply with provisions of the Brick Industry Association (BIA) Technical Notes on Brick Construction, except where exceeded by requirements of the contract documents.

1. Maintain one copy of each document on project site.
- D. Comply with provisions of National Concrete Masonry Association (NCMA) Tek Notes, except where exceeded by requirements of the contract documents.
1. Maintain one copy of each document on project site.
- E. Designer Qualifications: Perform design 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.
- F. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum ten years of documented experience.
- G. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.06 MOCK-UP

- A. Construct a masonry wall as a mock-up panel sized 8 feet long by 4 feet high; include mortar, accessories, structural backup, reinforcement, wall openings, flashings (with lap joint, corner, and end dam), weather barrier, wall insulation, and parging in mock-up.
1. Opening in mock-up shall be a minimum of 2'x2' and illustrate complete head, jamb and sill masonry and flashing details. Coordinate mock up with all related Sections and drawings.
- B. Build, protect and retain mock-up during construction as a standard for judging the completed work.
- C. Locate where directed.
- D. Mock-up may not remain as part of the Work.
- E. **Mock-up shall be approved by Architect before proceeding with the work.**

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.08 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
1. Extend cover a minimum of 24 inches (600 mm) down both sides and hold cover securely in place.
 2. Where 1 wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe and hold cover in place.
 3. Mason is responsible for the protection of the brick ledge flashing after completion by the Waterproofing Subcontractor.

4. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
5. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - a. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - b. Protect sills, ledges, and projections from mortar droppings.
 - c. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - d. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
 - e. 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 ACI 530.1/ASCE 6/TMS 602 and the following:
 - 1) The Contractor shall maintain masonry materials and surrounding air temperatures above 40 deg F (4 deg C) (with enclosures and heat sources on both sides of the wall and batching area also enclosed and heated as a minimum) prior to, during, and 48 hours after completion of the Work when temperatures are 40 deg F (4 deg C) or below.
 - 2) Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
 - 3) Cleaning shall not diminish the appearance or weather resistance of the building exterior or interior. Protect adjacent permanent surfaces from cleaning materials.
 - f. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 PRODUCTS

2.01 BRICK UNITS

- A. Facing Brick: ASTM C216, Type FBX, Grade SW; Tested and rated "Not Effloresced" in accordance with ASTM C67.
 1. Actual size: 3-5/8" x 7-5/8" x 2-1/4".
 2. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.

2.02 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I.

1. Not more than 0.60 percent alkali.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Mortar Aggregate: ASTM C144.
- D. Grout Aggregate: ASTM C404.
- E. Water: Clean and potable.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers:
 1. Blok-Lok Limited: www.blok-lok.com.
 2. Hohmann & Barnard, Inc: www.h-b.com. (Including Dur-O-Wal Brand.)
 3. WIRE-BOND www.wirebond.com.
 4. Substitutions: See Division One.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), deformed billet bars; uncoated.
- C. Vertical Rebar Positioners: Hohmann & Barnard, Inc.; RB Rebar Positioner and Twin Rebar Positioner.
- D. Horizontal Rebar Positioner: Dur-O-Wal; DA812.
- E. Rebar Lap-Joint Ties: Hohmann & Barnard, Inc.; Spyra-Lox Rebar Lap-Joint Ties
- F. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- G. Partition Top Anchor: Hohmann & Barnard, Inc.; PTA 420 HS, hot dip galvanized, or as detailed on the Structural Drawings. Structural Drawings shall be complied with in all cases unless specifically noted otherwise.
- H. Single Wythe Joint Reinforcement: ASTM A951/A951M.
 1. Type: Ladder.
 2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
 3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure and not more than 1 inch of mortar coverage on each exposure.
- I. Adjustable Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
 1. Type: Ladder, with adjustable ties spaced at 16 in on center and fabricated with moisture drip.
 2. Material: ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M Class B.

3. Size: 0.1875 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inchwire, width of components as required to provide not less than 5/8 inch of mortar coverage from each masonry face and not more than 1 inch of mortar coverage from each masonry face.
 4. Vertical adjustment: Not less than 2 inches.
 5. Insulation Clips: Provide clips at tabs or ties designed to secure insulation against outer face of inner wythe of masonry.
 6. Basis of Design: Hohmann & Barnard, Inc.; 270 Ladder - Adjustable Ladder Eye & Pintle Ties.
- J. Strap Anchors: Bent steel shapes, 1-1/2 inch width, 0.105 inch thick, 24 inch length, with 1-1/2 inch long, 90 degree bend at each end to form a U or Z shape or with cross pins, stainless steel.
- K. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not less than 5/8 inch of mortar coverage from masonry face.
- L. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
 2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
 3. Vertical adjustment: Not less than 3-1/2 inches.

2.04 FLASHINGS

- A. Metal Flashing Materials:
- B. Combination Non-Asphaltic Flashing Materials - Stainless Steel:
1. Stainless Steel/Polymer Fabric Flashing: ASTM A240/A240M; 2 mil type 304 stainless steel sheet bonded on one side to one sheet of polymer fabric.
 - a. Manufacturers:
 - 1) Hohmann & Barnard, Inc; Mighty-Flash Stainless Flashing: www.h-b.com.
 - 2) York Manufacturing, Inc; Multi-Flash SS: www.yorkmfg.com.
 - 3) Substitutions: See Division One.
- C. Drip Edge: Stainless steel; angled drip with hemmed edge; compatible with membrane and adhesives. Custom flashing as indicated on drawings. ASTM A666, Type 304, soft temper, 26 gauge (0.45 mm) thickness minimum, Finish 2B.
1. Coordinate with Section 07 62 00 Sheet Metal Flashing and Trim.
- D. Lap Sealant: Butyl Type as specified in Section 07 92 00 Joint Sealants.

2.05 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
 - 1. Manufacturers:
 - a. Blok-Lok Limited: www.blok-lok.com.
 - b. Hohmann & Barnard, Inc; RS Series - Rubber Control Joint: www.h-b.com.
 - c. WIRE-BOND: www.wirebond.com.
 - d. Substitutions: See Division One.
- B. Joint Filler: As specified in Section 07 92 00 Joint Sealants.
- C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
 - 1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
 - a. Manufacturers:
 - 1) Mortar Net Solutions; MortarNet with Insect Barrier: www.mortarnet.com.
 - 2) Hohmann & Barnard, Inc.; Mortar Trap: www.h-b.com.
 - 3) Keene Building Products; Keene Stone: www.keenebuilding.com.
 - 4) Substitutions: See Division One.
- D. Weep Tubes:
 - 1. Type: Polyethylene tubing with inserted cotton sash and insect screen at locations shown on drawings.
- E. Weep Vents:
 - 1. Type: Extruded propylene with honeycomb design.
 - 2. Color(s): As selected by Architect from manufacturer's full range.
- F. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
 - 1. **Use only products and methods approved in writing by the masonry manufacturer for each type of masonry being cleaned.**
- G. Primer for Stainless Steel/Polymer Fabric Flashing: As recommended by flashing manufacturer.
- H. Mastic/Sealant: As recommended by flashing manufacturer.
- I. Termination Bar: As recommended by flashing manufacturer.
- J. Weather Barrier: Coordinate with Section 07 25 00 Weather Barriers.

2.06 LINTELS

- A. Provide masonry lintels where shown and where openings of more than 12 inches for brick size units and 24 inches for block size units without structural steel or other supporting lintels. Reinforce as shown on Structural Drawings.
- B. Steel lintels specified in Section 05 50 00.
- C. Lintels as indicated on Structural Drawings.

2.07 MORTAR AND GROUT MIXING

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
 - 1. Masonry below grade and in contact with earth: Type S.
 - 2. Masonry above grade: Type N.
- B. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
- C. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
- D. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.04 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Brick Units:

1. Bond: Running and stacked as indicated on drawings.
2. Coursing: Three units and three mortar joints to equal 8 inches.
3. Mortar Joints: Concave.

3.05 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- F. Interlock intersections and external corners, except for units laid in stack bond.
- G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- I. Cut mortar joints flush where weather barrier is applied. Coordinate with Section 07 25 00 Weather Barriers.
- J. Cut mortar joints flush where cavity insulation vapor barrier adhesive is applied. Coordinate with Section 07 25 00, Weather barriers.
- K. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- L. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.06 WEEPS/CAVITY VENTS

- A. Install weeps in veneer and cavity walls at 16 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.
- B. Install cavity vents in veneer and cavity walls at 16 inches on center horizontally below shelf angles and lintels and near top of walls.

3.07 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

- C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents. Install in accordance with manufacturer's written installation instructions.

3.08 REINFORCEMENT AND ANCHORAGE - GENERAL AND SINGLE WYTHE MASONRY

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side and not more than 1 inch mortar cover on each side.
- E. Lap joint reinforcement ends minimum 6 inches.
- F. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.
- G. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 24 inches horizontally and 24 inches vertically.
- H. Embed ties and anchors in mortar joint and extend into masonry unit a minimum of 1-1/2 inches with at least 5/8 inch mortar cover to the outside face of the anchor.

3.09 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches on center vertically and 16 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.
- B. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 16 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.
- C. **Area of wall surface per veneer anchor shall not exceed 1.77 sq ft (0.16 sq m).**
- D. Place masonry joint reinforcement in first horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- E. Place continuous joint reinforcement in first joint below top of walls.
- F. Lap joint reinforcement ends minimum 6 inches.

3.10 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted. Including but not limited to lintels, shelf angles, and bottoms of wall cavities.

1. All flashings shall extend full width at such interruptions and at least 8 inches (200 mm) minimum into adjacent masonry, and shall turn up flashing ends at least 4 inches (100 mm) minimum, to form watertight pan.
 2. Remove or cover protrusions or sharp edges that could puncture flashings.
 3. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Install stainless steel flashing in accordance with manufacturer's instructions and BIA Technical Notes No. 7. Set stainless steel flashings specified in Section 07 62 00 Sheet Metal Flashing and Trim in full bed of butyl sealant, specified in Section 07 92 00 Joint Sealants.
- C. Lap stainless steel seams 4 inches and "bayonet" seal watertight with mastic.
- D. Extend metal flashings through exterior face of masonry and terminate in an angled drip with hemmed edge. Install joint sealer below drip edge to prevent moisture migration under flashing.
- E. Apply primer for Stainless Steel/Polymer Fabric Flashing to substrate at approximately 150 sq ft per gallon. Let primer dry for approximately 30 minutes or when dry to touch. Re-prime surface if primed area has been left exposed for 24 hours.
- F. Apply Stainless Steel/Polymer Fabric Flashing to primed surfaces including drip edge flashing, in sections of 8 ft. in length or less.
1. Lap all seams a minimum of four inches.
 2. Use a roller to firmly press membrane onto surface without air pockets.
 3. Neatly apply mastic on top of the overlap at 1/8"-1/4" thickness x 1-1/2" wide.
- G. Extend Stainless Steel/Polymer Fabric Flashing through wall full width at such interruptions and turn up to terminate flashing at least 16 inches (400 mm) on vertical surface of backup wall, 6 inches minimum above cavity mortar control.
1. Install vertical leg of flashing over fluid-applied or self-adhered air/vapor barriers over backup wall.
 2. Anchor vertical leg of flashing into backup wall with a termination bar and sealant.
 3. Lap end joints of flashings at least 6 inches (152 mm), minimum, and seal watertight with mastic.
 4. Use a roller to firmly press membrane onto surface of wall and drip edge flashing without air pockets or wrinkles.
 5. Neatly apply mastic at top of vertical flashing at 1/8"-1/4" thickness x 1-1/2 " wide. Install termination bar at top of flashing and seal. Apply cap bead of sealant on top edge of termination bar.
 6. Turn both stainless steel and membrane flashings up at ends a minimum of 4 inches to form watertight pan for end dams.
- H. Support flexible flashings across gaps and openings.

- I. Hold outer edge of Stainless Steel / Polymer Fabric Flashing back 3/4 inch (20 mm) from the exposed exterior face of wall and adhere to top of stainless steel angled drip edge flashing with hemmed drip edge. Install a neatly tooled bead of mastic along the front edge of membrane using a caulking gun.

3.11 LINTELS

- A. Install loose steel lintels over openings.
- B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
 1. Do not splice reinforcing bars.
 2. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
 3. Place and consolidate grout fill without displacing reinforcing.
 4. Allow masonry lintels to attain specified strength before removing temporary supports.
 5. Maintain minimum bearing on each side of opening as indicated on Structural drawings.

3.12 GROUTED COMPONENTS

- A. Lap splices minimum distance shown on Structural drawings.
- B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- C. Place and consolidate grout fill without displacing reinforcing.
- D. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.13 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Form expansion joint as detailed on drawings.
- D. Space control joints at maximum 20 ft on center at exterior locations and 20 to 30 ft on center at interior locations or as shown on drawings. For joints not shown on drawings, obtain Architect's approval prior to installation.

3.14 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames, glazed frames, anchor bolts, and plates and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.

1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.15 TOLERANCES

- A. Install masonry within the site tolerances found in TMS 402/602.
- B. Maximum Variation from Alignment of Columns: 1/4 inch.
- C. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- D. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- E. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- F. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- G. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft (3 mm/m).
- H. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.16 CUTTING AND FITTING

- A. Cut and fit for pipes, conduit, sleeves, and louvers and other items. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.17 PARGING

- A. Dampen masonry walls prior to parging.
- B. Scarify each parging coat to ensure full bond to subsequent coat.
- C. Parge masonry walls in two uniform coats of mortar to a total thickness of 2 inch.
- D. Steel trowel surface smooth and flat with a maximum surface variation of 1/8 inch per foot.
- E. Strike top edge of parging at 45 degrees.

3.18 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Division One.
- B. Clay Masonry Unit Tests: Test each variety of clay masonry in accordance with ASTM C67/C67M requirements, sampling 5 randomly chosen units for each 50,000 installed.
- C. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.
- D. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

3.19 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Before full-scale application of cleaning products begins, review manufacturers application data to determine suitability of cleaning of specific materials and surfaces. Apply cleaner to test area to determine optimum dwell time, compatibility, effectiveness, rinsing, and other pertinent application procedures that would affect the effectiveness of the cleaning operations with respect to desired results. Use the least caustic materials and methods required to produce desired results. Allow test areas to dry thoroughly before evaluating the final results with the Architect.
- D. Clean soiled surfaces with cleaning solution in accordance with manufacturer's recommendations. If improvements are necessary to achieve proper cleaning of surfaces, alternate cleaning methods may be used only with approval of the Architect.
- E. Use non-metallic tools in cleaning operations.

3.20 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 04 2000

**SECTION 05 5000
METAL FABRICATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items.
- B. Prefabricated items.

1.02 SUBMITTALS

- A. See Division One for submittal procedures.
- B. Product Information and Installation Instructions for Stair Nosings.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- D. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.
- E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501, Grade B cold- formed structural tubing.
- C. Plates: ASTM A283.
- D. Pipe: ASTM A53/A53M, Grade B Schedule 40.
- E. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, plain.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction. Comply with VOC restrictions in Section 01 8113 Sustainable Design Requirements.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.

- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by 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.
- G. Finish Exterior Items And Other Items Designated To Be Galvanized: Galvanize after fabrication accordance with requirements of ASTM A123/A123M, Grade 75, 1.75 oz/sq. ft. galvanized coating, minimum.
 - 1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic.
- H. Prime Paint Non- Galvanized Items: Two coats SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- I. Grind, file and sand as required to remove all rough, un-even, sharp protrusions such as weld splatter, deleterious matter from hot dip galvanizing operations or other inconsistencies as required to provide a smooth surface on rails. Coordinate with Section 09 90 00, Painting and Coating.
- J. Welded Joints:
 - 1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
 - 2. 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.

2.03 FABRICATED ITEMS

- A. Pipe and Tube Railings: As detailed on drawings; Galvanized finish.
- B. Ledge Angles, Shelf Angles, and other miscellaneous angles shown on drawings: ASTM A36/A36M steel angles with galvanized finish.
- C. Lintels: ASTM A36/A36M steel angle as detailed; galvanized finish.
- D. Other miscellaneous metal fabrications shown on drawings, but not necessarily listed herein.

2.04 FINISHES - STEEL

- A. Hot dip galvanize all steel items.
 - 1. Exceptions: Elevator hoistway beam and stairway gate.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

- D. Prime Painting: One coat.
- E. Galvanizing of structural and non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

2.05 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Grind, file and sand as required to remove all rough, un-even, sharp protrusions such as weld splatter or other inconsistencies as required to provide a smooth surface on rails. Coordinate with Section 09 9000, Painting and Coating.
- C. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install roof access ladders in accordance with manufacturers written installation instructions.
- 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. Field weld components indicated on drawings.
- E. Perform field welding in accordance with AWS D1.1/D1.1M.
- F. Obtain approval prior to site cutting or making adjustments not scheduled.
- G. After erection, prime welds, abrasions, and surfaces not galvanized.

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 5000

**SECTION 061000
ROUGH CARPENTRY**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Shear wall panels.
4. Rooftop equipment bases and support curbs.
5. Wood blocking, cants, and nailers.
6. Wood furring and grounds.
7. Wood sleepers.
8. Plywood backing panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

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

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Shear panels.
5. Power-driven fasteners.
6. Powder-actuated fasteners.
7. Expansion anchors.

8. Metal framing anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Certified Wood: Materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship for the following:
 1. Dimension lumber framing.
 2. Laminated-veneer lumber.
 3. Parallel-strand lumber.
 4. Prefabricated wood I-joists.
 5. Rim boards.
 6. Miscellaneous lumber.
- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
 3. Provide dressed lumber, S4S, unless otherwise indicated.
- C. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.
- D. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, which meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
 - 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 15 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings, and the following:
 - 1. Framing for raised platforms.
 - 2. Framing for stages.
 - 3. Concealed blocking.
 - 4. Framing for non-load-bearing partitions.
 - 5. Framing for non-load-bearing exterior walls.

6. Roof construction.
7. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Standard, Stud, or No. 3 grade.
 1. Application: Interior partitions not indicated as load-bearing.
 2. Species:
 - a. Mixed southern pine; SPIB.
 - b. Northern species; NLGA.
 - c. Eastern softwoods; NeLMA.
 - d. Western woods; WCLIB or WWPA.
- B. Framing Other Than Non-Load-Bearing Interior Partitions: As shown on the drawings.
 1. Application: Framing other than interior partitions not indicated as load-bearing.
 2. Species:
 - a. Hem-fir (north); NLGA.
 - b. Southern pine; SPIB.
 - c. Douglas fir-larch; WCLIB or WWPA.
 - d. Mixed southern pine; SPIB.
 - e. Spruce-pine-fir; NLGA.
 - f. Douglas fir-south; WWPA.
 - g. Hem-fir; WCLIB or WWPA.
 - h. Douglas fir-larch (north); NLGA.
 - i. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
- C. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
 1. Application: Exposed exterior and interior framing indicated to receive a stained or natural finish.
 2. Species and Grade: As indicated above for load-bearing construction of same type.

2.5 ENGINEERED WOOD PRODUCTS

- A. Engineered Wood Products, General: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- B. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
 - 1. Extreme Fiber Stress in Bending, Edgewise: As shown on drawings.
 - 2. Modulus of Elasticity, Edgewise: As shown on drawings.
- C. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Provide units complying with material requirements of and with structural capacities established and monitored according to ASTM D 5055.
 - 1. Web Material: Either oriented strand board or plywood, complying with DOC PS 1 or DOC PS 2, Exposure.
 - 2. Structural Properties: Provide units with depths and design values not less than those indicated.
 - 3. Provide units complying with APA PRI-400, factory marked with APA trademark indicating nominal joist depth, joist class, span ratings, mill identification, and compliance with APA standard.
- D. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research/evaluation report for I-joists.
 - 1. Material: Product made from any combination solid lumber, wood strands, and veneers.
 - 2. Thickness: 1-1/4 inches (32 mm).
 - 3. Provide performance-rated product complying with APA PRR-401, rim board grade, factory marked with APA trademark indicating thickness, grade, and compliance with APA standard.

2.6 SHEAR WALL PANELS

- 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:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

- 1. Shear Transfer Systems.
- 2. Simpson Strong-Tie Co., Inc.
- 3. Weyerhaeuser Company.

Wood-Framed Shear Wall Panels: Prefabricated assembly consisting of wood perimeter framing, tie downs, and Exposure I, Structural I plywood or OSB sheathing.

- 4. Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Steel-Framed Shear Wall Panels: Prefabricated assembly consisting of cold-formed galvanized steel panel, steel top and bottom plates, and wood studs.

- D. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, which meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.7 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Cants.
 - 5. Furring.
 - 6. Grounds.
- B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber of any species.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
 - 1. Mixed southern pine; No. 2 grade; SPIB.
 - 2. Eastern softwoods; No. 2 Common grade; NeLMA.
 - 3. Northern species; No. 2 Common grade; NLGA.
 - 4. Western woods; Construction or No. 2 Common; WCLIB or WWPA.

2.8 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: DOC PS 1, Exterior, AC in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.
 - 1. Plywood shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.9 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or Type 304 stainless steel.
- B. Power-Driven Fasteners: NES NER-272.
- C. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

2.10 METAL FRAMING ANCHORS

- 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:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Cleveland Steel Specialty Co.
 - 2. KC Metals Products, Inc.
 - 3. Phoenix Metal Products, Inc.
 - 4. Simpson Strong-Tie Co., Inc.
 - 5. USP Structural Connectors.
- C. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, which meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- D. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- E. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.

2.11 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- C. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

- B. Framing Standard: Comply with details provided in the American Wood Council, "Wood Frame Construction Manual" unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Shear Wall Panels: Install shear wall panels to comply with manufacturer's written instructions.
- F. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- G. Do not splice structural members between supports unless otherwise indicated.
- H. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 23010.2 "Fastening Schedule," in ICC's International Building Code.
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

3.2 PROTECTION

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

END OF SECTION 06 1000

SECTION 061753
SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood roof trusses.
 - 2. Wood floor trusses.
 - 3. Wood girder trusses.
 - 4. Wood truss bracing.
 - 5. Metal truss accessories.
- B. Allowances: Provide wood truss bracing under the Metal-Plate-Connected Truss Bracing Allowance as specified in Division 01 Section "Allowances."

1.2 ACTION SUBMITTALS

- A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.
- B. Shop Drawings: Show fabrication and installation details for trusses.
 - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
 - 2. Indicate sizes, stress grades, and species of lumber.
 - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
 - 6. Show splice details and bearing details.
- C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Evaluation Reports: For the following, from ICC-ES:
 - 1. Metal-plate connectors.
 - 2. Metal truss accessories.

1.4 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
 - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that [participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.

2.2 DIMENSION LUMBER

- A. Certified Wood: For metal-plate-connected wood trusses and permanent bracing, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
- C. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Division 06 Section "Rough Carpentry."

2.3 METAL CONNECTOR PLATES

- A. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
 - 1. Alpine Engineered Products, Inc.; an ITW company.
 - 2. Cherokee Metal Products, Inc.; Masengill Machinery Company.

3. CompuTrus, Inc.
 4. Eagle Metal Products.
 5. Jager Building Systems, Inc.; a Tembec/SGF Rexfor company.
 6. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
 7. Robbins Engineering, Inc.
 8. Truswal Systems Corporation; an ITW company.
- B. General: Fabricate connector plates to comply with TPI 1.
- C. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 (Z180) coating designation; and not less than 0.036 inch (0.9 mm) thick.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
 2. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Cleveland Steel Specialty Co.
 2. KC Metals Products, Inc.
 3. Phoenix Metal Products, Inc.
 4. Simpson Strong-Tie Co., Inc.
 5. USP Structural Connectors.
- C. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those [indicated] [of basis-of-design products] [of products of manufacturers listed]. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- D. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

2.6 FABRICATION

- A. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- B. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- F. Securely connect each truss ply required for forming built-up girder trusses.
- G. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install bracing to comply with Division 06 Section "Rough Carpentry."
 - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- H. Install wood trusses within installation tolerances in TPI 1.
- I. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- J. Replace wood trusses that are damaged or do not meet requirements.

END OF SECTION 061753

**SECTION 06 4101
ARCHITECTURAL CASEWORK**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated Plastic Laminate cabinet units.
- B. Solid Surface Countertops.
- C. Plastic Laminate Countertops.
- D. Solid Surface Window stools and aprons.
- E. Cabinet hardware for Plastic Laminate Cabinets.
- F. Plastic Laminate Shelving with Wall Mounted Adjustable Standards and Brackets.

1.02 SUBMITTALS

- A. See Division One, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Provide the information required by AWI/AWMAC/WI Architectural Woodwork Standards, Appendix A605- A607.

1.03 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage in compliance with in accordance with AWI//AWMAC/WI Architectural Woodwork Standards Section 1700, Installation of woodwork, for Custom Grade..

1.05 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 CABINETS

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI Architectural Woodwork Standards Section 400, Architectural Cabinets, for Custom Grade.

2.02 LAMINATE MATERIALS

- A. Manufacturers:

1. Formica Corporation: www.formica.com.
 2. Panolam Industries International, Inc: www.nevamar.com.
 3. Basis of Design: Wilsonart International, Inc: www.wilsonart.com.
 4. Substitutions: See Division One.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- C. Provide specific types as follows:
1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, colors as scheduled, finish as scheduled. See Finish Schedule on Drawings
 2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, colors as scheduled, finish as scheduled. See Finish Schedule on Drawings
 3. Cabinet Liner: CLS, 0.020 inch nominal thickness, colors as scheduled, finish as scheduled. See Finish Schedule on Drawings
 4. Backer Sheet: Paper backing required on ALL concealed backside of panels faced with high pressure decorative laminate.

2.03 COUNTERTOPS, WINDOW STOOLS AND APRONS

- A. Solid surfacing sheet over continuous substrate for counter tops and over continuous substrate for window stools and aprons.
1. Flat Sheet Thickness: 1/2 inch minimum shown on drawings.
 2. 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.
 - a. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 3. See finish schedule on drawings for manufacturer, product, color, finish and locations.
 - a. Finish on Exposed Surfaces: Semi-gloss, gloss rating of 25 to 50.
 - b. Color and Pattern: As indicated on drawings.
 - c. Manufacturers:
 - 1) Avonite Surfaces: www.avonitesurfaces.com.
 - 2) Formica Corporation: www.formica.com.
 - 3) Basis of Design: Wilsonart International, Inc.: www.wilsonart.com.

- 4) Substitutions: See Division 1.
4. Other Components Thickness: thickness in inch's, minimum shown on drawings.
5. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge; use marine edge at sinks.
6. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
7. Skirts: As indicated on drawings.
8. Fabricate in accordance with manufacturer's standard requirements.

2.04 PLASTIC LAMINATE COUNTERTOPS

- A. Plastic Laminate Countertops: Medium density fiberboard substrate covered with HPDL, conventionally fabricated and self-edge banded. Provide laminate backer on all concealed backsides of panels faced with high pressure decorative laminate.
- B. Plastic Laminate Counter Top Support Brackets: Where countertops are unsupported by cabinets or walls, for a clear span of over 36 inches, install support brackets at 36 inches on center.
 1. Product: Lyman Associates Inc, Pre- finished Counter Top Supports; www.lymanassociates.com/topsupport.htm.
 - a. Finish: High impact powdercoat, color; Black.

2.05 ACCESSORIES

- A. Adhesive: Type recommended by AWI/AWMAC to suit application.
- B. Fasteners: Size and type to suit application.
- C. Concealed Joint Fasteners: Threaded steel.
- D. Grommets: Standard plastic or rubber grommets for cut-outs, in color to contrast with adjacent surface.

2.06 HARDWARE

- A. Hardware: BHMA A156.9, types as indicated for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards and coordinated shelf rests, satin chrome finish, for nominal 1 inch spacing adjustments. BHMA No. B04071 standards with BHMA No. B04081 closed shelf rests.
- C. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 4 inch centers.
- D. Cabinet and Drawer Locks (when and where shown on drawings): Keyed cam lock cylinder with strike plate, two keys per lock, master keyed, steel with satin finish. Provide one lockset and strike plate for each cabinet door and drawer. Mortise all strike plates so that they are flush with the surface of the cabinet. Key all of the cabinets in a given room the same. Key each room differently. Provide six master keys capable of unlocking any of the locks provided in any room. Locks must be capable of locking upward, downward, in the three o'clock position and in the nine o'clock position depending on actual conditions.

- E. Drawer Slides:
 - 1. Type: Standard extension.BHMA No. B05052
 - 2. Static Load Capacity: Commercial grade (75#) at all drawers except use extra heavy duty(100#) at file drawers under 24 inches wide. Use extra heavy duty 150 # at file drawers 24 inches to 30 inches wide. Use extra heavy duty 200 # for drawers 30 inches and wider.
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.
- F. Hinges: European style concealed self-closing type, 110 degree opening, BHMA No. B01602, steel with satin finish.

2.07 PLASTIC LAMINATE SHELVING SUPPORTS

- A. Adjustable Shelf Supports: Standard back-mounted system using surface mounted metal shelf standards and coordinated cantilevered shelf brackets, satin chrome finish, for nominal 1 inch spacing adjustments.
 - 1. Brackets: 16 gauge minimum double flange steel brackets for 8 inch to 12 inch deep shelves. 14 gauge minimum double flange steel brackets for 14 inch to 24 inch deep shelves.
 - 2. Standards: 16 gauge minimum double slot steel.
 - 3. Shelf Rests: Manufacturers standard. Use at any shelves in excess of 4 feet in width to anchor shelves to standards as recommended in manufacturers installation instructions.

2.08 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
 - 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
 - 2. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- E. Provide cutouts for plumbing fixtures, outlet boxes, and similar items. Verify locations of cutouts from on-site dimensions. Seal cut edges.
- F. Fabricate solid surface countertops, integrated sinks, window stools and aprons in accordance with manufacturers instructions and consistent with drawings for profiles, thickness and details.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

- A. General: Install work in accordance with AWI//AWMAC/WI Architectural Woodwork Standards Section 400, Architectural Cabinets, for Custom Grade.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units and countertops.
- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- F. Secure cabinets to floor using appropriate angles and anchorages.
- G. Install solid surface countertops, window stools and aprons in accordance with manufacturers instructions and consistent with drawings for profiles, thickness and details.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

3.05 SCHEDULES

- A. See Drawings.

END OF SECTION 06 4101

**SECTION 06 8316
FIBERGLASS REINFORCED PANELING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiberglass reinforced plastic panels.
- B. Trim.

1.02 REFERENCE STANDARDS

- A. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2017.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021a.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fiberglass Reinforced Plastic Panels:
 - 1. Crane Composites, Inc: www.cranecomposites.com/#sle.
 - 2. Marlite, Inc: www.marlite.com/#sle.
 - 3. Nudo Products, Inc: www.nudo.com/#sle.
 - 4. Substitutions: See Division 1.

2.02 PANEL SYSTEMS

- A. Wall Panels:
 - 1. Panel Size: 4 by 8 feet.
 - 2. Panel Thickness: 0.10 inch.
 - 3. Surface Design: Embossed.
 - 4. Color: As selected by Architect.
 - 5. Attachment Method: Adhesive only, sealant joints, no trim.

2.03 MATERIALS

- A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
 - 1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
- B. Trim: Vinyl; color coordinating with panel.

- C. Sealant: Type recommended by panel manufacturer; white.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions and substrate flatness before starting work.
- B. Verify that substrate conditions are ready to receive the work of this section.

3.02 INSTALLATION - WALLS

- A. Install panels in accordance with manufacturer's instructions.
- B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
- C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
- D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
- E. Install panels with manufacturer's recommended gap for panel field and corner joints.
- F. Place trim on panel before fastening edges, as required.
- G. Fill channels in trim with sealant before attaching to panel.
- H. Install trim with adhesive and screws or nails, as required.
- I. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
- J. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION 06 8316

**SECTION 07 2100
THERMAL INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation at perimeter foundation wall and underside of floor slabs.
- B. Batt insulation in exterior wall, ceiling, and roof construction.

1.02 REFERENCE STANDARDS

- A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021a.

1.03 SUBMITTALS

- A. See Division One for Submittal Procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.
- D. Sustainability Submittals:
 - 1. Recycled Content.
 - 2. Adhesives and Sealants.
 - a. Product Data: Provide data supporting claims made in forms listed above.

1.04 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Insulation:
 - 1. Basis of Design ACH Foam Technologies Polar-R; www.achfoam.com. Thickness and locations as shown on drawings.
 - a. Below Grade Foundation Walls: Type IX (25 psi), R-7.5.
 - b. Underslab: Type IX (25 psi), R-10.
 - 2. Substitutions: See Division 1.

2.02 BATT INSULATION MATERIALS

- A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option.
- B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 - 1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - 3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 - 4. Formaldehyde Content: Zero.
 - 5. Thermal Resistance: R-value of 21.
 - 6. Manufacturers:
 - a. CertainTeed Corporation: www.certainteed.com/#sle.
 - b. Johns Manville: www.jm.com/#sle.
 - c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: www.ocbuildingspec.com/#sle.
 - 7. Substitutions: See Division 1.
- C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
 - 3. Manufacturers:
 - a. Johns Manville; MinWool Sound Attenuation Fire Batts: www.jm.com/#sle.
 - b. Knauf Insulation; EcoBatt Insulation: www.knaufinsulation.com/#sle.
 - c. Thermafiber, Inc; SAFB: www.thermafiber.com/#sle.
 - d. Substitutions: See Division 1.

2.03 ACCESSORIES

- A. Adhesive: Type recommended by insulation manufacturer for application.

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 and adhesive.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION UNDER CONCRETE SLABS

- 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 vapor retarder and placing slab.

3.03 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

3.04 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION 07 2100

**SECTION 07 2500
WEATHER BARRIERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls.

1.02 DEFINITIONS

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.

1.03 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; 2020.
- B. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- C. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

1.04 SUBMITTALS

- A. See Section 01 3300 - Submittals, for submittal procedures.
- B. Product Data: Provide data on material characteristics.
- C. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

1.05 QUALITY ASSURANCE

- A. Air Barrier Association of America (ABAA) Evaluated Materials Program (EAP); www.airbarrier.org/#sle: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture, and use secondary materials approved in writing by primary material manufacturer.

1.06 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES

- A. Air Barrier:
 - 1. On outside surface of single wythe masonry and concrete exterior walls use air barrier coating.
 - 2. On outside surface of sheathing of exterior walls use air barrier coating.

2.02 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

- A. Air Barrier, Fluid Applied: Vapor permeable, elastomeric waterproofing.
 - 1. Air Barrier Coating:
 - a. Air Permeance: 0.001 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
 - b. Water Vapor Permeance: 18 perms, minimum, when tested in accordance with ASTM E96/E96M, Procedure B.
 - c. Manufacturers:
 - 1) Basis of Design Product: DuPont Building Innovations; Tyvek Fluid Applied WB with Tyvek Fluid Applied Flashing and Joint Compound, Sealant for Tyvek Fluid Applied System and StraightFlash: www.dupont.com/#sle.
 - 2) BASF Corporation; MasterSeal AWB 660: www.master-builders-solutions.basf.us/#sle.
 - 3) Dow Chemical Company; Defend Air 200: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
 - 4) Substitutions: See Division 1.

2.03 ACCESSORIES

- A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.
- B. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement is waived if not installed on a roof.
 - 1. Composition: Modified bituminous sheet laminated to polyethylene sheet.
 - 2. Thickness: 70 mil, 0.070 inch, nominal.
- C. Sill Plate Sealer: Closed-cell foam tape with rubberized adhesive membrane; bridges gap between foundation structure and sill plate or skirt board.
 - 1. Width: 5-1/2 inches.
 - 2. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 30 days of weather exposure.

- D. Thinners and Cleaners: As recommended by material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work of this section.

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 in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
- D. Coatings:
 - 1. Prepare substrate in manner recommended by coating manufacturer; treat joints in substrate and between dissimilar materials as recommended by manufacturer.
 - 2. Use flashing to seal to adjacent construction and to bridge joints.
- E. Openings and Penetrations in Exterior Weather Barriers:
 - 1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
 - 2. At openings to be filled 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 to be filled with non-flanged frames, seal weather barrier to each side of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
 - 4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather 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 weather barrier surface.

3.04 FIELD QUALITY CONTROL

- A. Do not cover installed weather barriers until required inspections have been completed.
- B. Take digital photographs of each portion of the installation prior to covering up.

3.05 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION 07 2500

**SECTION 07 3113
ASPHALT SHINGLES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Asphalt shingle roofing.
- B. Flexible sheet membranes for eave protection, underlayment, and valley protection.
- C. Associated metal flashings and accessories.

1.02 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; 2020.
- B. ASTM D3161/D3161M - Standard Test Method for Wind Resistance of Steep Slope Roofing Products (Fan-Induced Method); 2020 (Reapproved 2025).
- C. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules; 2023.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- E. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2020a.
- F. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples; 2021.
- G. NRCA (RM) - The NRCA Roofing Manual; 2025.
- H. UL (DIR) - Online Certifications Directory; Current Edition.

1.03 SUBMITTALS

- A. See Division 1 for submittal procedures.
- B. Product Data: Provide data indicating material characteristics.
- C. Shop Drawings: For metal flashings, indicate specially configured metal flashings.
- D. Samples: Submit two samples of each shingle color indicating color range and finish texture/pattern ; for color selection.
- E. Manufacturer's Installation Instructions: Indicate installation criteria and procedures.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Shingles: 25 sq ft of each type and color.

1.04 QUALITY ASSURANCE

- A. Products are Required to Comply with Fire Resistance Criteria: UL (DIR) listed and labeled.

1.05 FIELD CONDITIONS

- A. Do not install shingles or eave protection membrane when surface temperatures are below 45 degrees F.

1.06 WARRANTY

- A. See Division 1 for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide lifetime manufacturer's warranty for coverage against black streaks caused by algae.
- D. Provide five year manufacturer's warranty for wind damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Asphalt Shingles:
 1. GAF; Timberline Cool Series: www.gaf.com/#sle.
 2. IKO Industries Inc; CAMBRIDGE COOL COLORS: www.iko.com/#sle.
 3. Owens Corning Corp; Cool Roof Collection: www.owenscorning.com/#sle.
 4. Substitutions: See Division 1.

2.02 ASPHALT SHINGLES

- A. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D3462/D3462M.
 1. Fire Resistance: Class A, complying with ASTM E108.
 2. Wind Resistance: Class A, when tested in accordance with ASTM D3161/D3161M.
 3. Self-sealing type.
 4. Style: Staggered edge butt.
 5. Color: As selected by Architect.

2.03 SHEET MATERIALS

- A. Eave Protection Membrane:

1. Eave Protection Membrane: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.
- B. Underlayment: Synthetic non-asphaltic sheet, intended by manufacturer for mechanically fastened roofing underlayment without sealed seams.
1. Type: Woven polypropylene with anti-slip polyolefin coating on both sides.
 2. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 3. Flammability: Minimum of Class A, when tested in accordance with ASTM E108.
 4. Ultraviolet (UV) Resistance and Weatherability: Approved in writing by manufacturer for exposure to weather for minimum of six months.
 5. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
 6. Water Vapor Permeance: Vapor retarder; maximum of 0.1 perm, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).
 7. Fasteners: As recommended by manufacturer or building code qualification report or approval.
 8. Manufacturers:
 - a. System Components Corporation, Inc; FelTex: www.systemcomponents.net/#sle.
 - b. Substitutions: See Division 1.

2.04 ACCESSORIES

- A. Roofing Nails: Standard round wire shingle type, galvanized steel, stainless steel, aluminum roofing nails, or copper roofing nails, minimum 3/8 inch head diameter, 12 gauge, 0.109 inch nail shank diameter, 1-1/2 inch long and complying with ASTM F1667.
- B. Lap Cement: Fibrated cutback asphalt type, recommended for use in application of underlayment, free of toxic solvents.
- C. Plastic Ridge Vents: Extruded plastic with vent openings that do not permit direct water or weather entry; flanged to receive shingles.

2.05 METAL FLASHINGS

- A. Metal Flashings: Provide sheet metal eave edge, gable edge, open valley flashing, and other flashing indicated.
- B. Aluminum Sheet Metal: Prefinished aluminum, 26 gauge, 0.017 inch minimum thickness; stucco embossed, PVC coating, color as selected.
- C. Bituminous Paint: Acid and alkali resistant type; black color.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.
- B. Verify that roof deck is of sufficient thickness to accept fasteners.
- C. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.
- D. Verify roof openings are correctly framed.
- E. Verify deck surfaces are dry, free of ridges, warps, or voids.

3.02 PREPARATION

- A. Seal roof deck joints wider than 1/16 inch as recommended by shingle manufacturer.
- B. At areas where eave protection membrane is to be adhered to substrate, fill knot holes and surface cracks with latex filler.
- C. Broom clean deck surfaces before installing underlayment or eave protection.
- D. Install eave edge flashings tight with fascia boards, weather lap joints 2 inches and seal with plastic cement, and secure flange with nails spaced 12 inches on center.

3.03 INSTALLATION - EAVE PROTECTION MEMBRANE

- A. Install eave protection membrane from eave edge to minimum 4 ft up-slope beyond interior face of exterior wall.
- B. Install eave protection membrane in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.

3.04 INSTALLATION - UNDERLAYMENT

- A. Underlayment At Roof Slopes Up to 4:12: Install two layers of underlayment over area not protected by eave protection, with ends and edges weather lapped minimum 4 inches, stagger end laps of each consecutive layer, and nail in place.
- B. Underlayment At Roof Slopes Greater Than 4:12: Install underlayment perpendicular to slope of roof, with ends and edges weather lapped minimum 4 inches, stagger end laps of each consecutive layer, nail in place, and weather lap minimum 4 inches over eave protection.
- C. Weather lap and seal watertight with plastic cement any items projecting through or mounted on roof.

3.05 INSTALLATION - VALLEY PROTECTION

- A. Install flexible flashing in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Weather lap joints minimum 2 inches.
- C. Nail in place minimum 18 inches on center, 1 inch from edges.

- D. At Exposed Valleys: Install one layer of sheet metal flashing, minimum 24 inches wide, centered over open valley and crimped to guide water flow, weather lap joints minimum 2 inch wide band of lap cement along each edge of first layer, press roll roofing into cement, nail in place minimum 18 inches on center and 1 inch from edges.

3.06 INSTALLATION - METAL FLASHING AND ACCESSORIES

- A. Install flashings in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Weather lap joints minimum 2 inches and seal weather tight with plastic cement.
- C. Secure in place with nails at 12 inches on center, and conceal fastenings.
- D. Items Projecting Through or Mounted on Roofing: Flash and seal weather tight with plastic cement.

3.07 INSTALLATION - SHINGLES

- A. Install shingles in accordance with manufacturer's instructions manufacturer's instructions and NRCA (RM) applicable requirements.
 - 1. Fasten individual shingles using two nails per shingle, or as required by manufacturer and local building code, whichever is greater.
 - 2. Fasten strip shingles using four nails per strip, or as required by manufacturer and local building code, whichever is greater.
- B. Place shingles in straight coursing pattern with 5 inch weather exposure to produce double thickness over full roof area, and provide double course of shingles at eaves.
- C. Project first course of shingles 3/4 inch beyond fascia boards.
- D. Extend shingles 1/2 inch beyond face of gable edge fascia boards.
- E. Cap hips with individual shingles, maintaining 5-inch weather exposure, and place to avoid exposed nails.
- F. After installation, place one daub of plastic cement, 1-inch diameter under each individual shingle tab exposed to weather, to prevent lifting.
- G. Coordinate installation of roof mounted components or work projecting through roof with weather tight placement of counterflashings.
- H. Complete installation to provide weather tight service.

3.08 PROTECTION

- A. Do not permit traffic over finished roof surface.

END OF SECTION 07 3113

**SECTION 07 4112
METAL SOFFIT PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural soffit systems of preformed aluminum panels.

1.02 SUBMITTALS

- A. See Division 1 for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Storage and handling requirements and recommendations.
 - 2. Installation methods.
 - 3. 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.
- D. Verification Samples: For each system specified, submit samples of minimum size 12 inches square, representing actual roofing metal, thickness, profile, color, and texture.
- E. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Store panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.04 WARRANTY

- A. See Division 1 for additional warranty requirements.
- B. 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 within specified warranty period of five years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Soffit Panels-Exterior:
 - 1. Berridge Manufacturing Company; Vee -Panel, Vented: www.berridge.com/#sle.

2. Englert, Inc; www.englertinc.com/#sle
3. Petersen Aluminum Corporation; PAC-850 Soffit: www.pac-clad.com/#sle
4. Substitutions: See Division 1.

2.02 SOFFIT PANELS

A. Metal Soffit Panels:

1. Profile: Style as indicated, with venting provided.
2. Material: Precoated steel sheet, 24 gauge.
3. Color: As selected by Architect from manufacturer's standard line.

2.03 ATTACHMENT SYSTEM

- ### **A. Concealed System:** Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.04 ACCESSORIES

- ### **A. Miscellaneous Sheet Metal Items:** Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
- ### **B. Rib and Ridge Closures:** Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.
- ### **C. Sealants:**
1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
 2. Concealed Sealant: Non-curing butyl sealant or tape sealant.

PART 3 EXECUTION

3.01 EXAMINATION

- ### **A.** Do not begin installation of preformed metal roof panels 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 INSTALLATION

- ### **A. Overall:** Install system in accordance with 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.
1. Install system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.

2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.

3.03 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.

3.04 PROTECTION

- A. Touch-up, repair, or replace damaged panels or accessories before Date of Substantial Completion.

END OF SECTION 07 4112

SECTION 07 4114

METAL ROOF PANELS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Architectural roofing system of preformed steel panels.

1.02 SUBMITTALS

- A. See Division One for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Storage and handling requirements and recommendations.
 - 2. Installation methods.
 - 3. 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.
- D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.
- E. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.04 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.

1.05 WARRANTY

- A. 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 within specified warranty period of twenty years from Date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design:

1. Architectural Metal Roof Panels: TEE Panel manufactured by Berridge Manufacturing Company.
- B. Other Acceptable Manufacturers; Architectural Metal Roof Panels:
 1. Morin Corporation: www.morincorp.com/#sle.
 2. Petersen Aluminum Corporation: www.pac-clad.com/#sle.
 3. Substitutions: See Division One.

2.02 ARCHITECTURAL METAL ROOF PANELS

- A. Architectural Metal Roof Panels: Provide complete engineered system complying with specified requirements and capable of remaining weather-tight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
- B. Architectural Metal Panels: Factory-formed panels with factory-applied finish.
 1. Steel Panels:
 - a. Steel Thickness: Minimum 24 gauge (0.024 inch).
 2. Profile: Standing seam, with minimum 1.0 inch seam height; concealed fastener system for snap-on application of matching standing seam batten.
 3. Texture: Smooth.
 4. Length: Full length of roof slope, without lapped horizontal joints.
 5. Width: Maximum panel coverage of 12-3/4 inches.

2.03 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard steel concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.04 FABRICATION

- A. Panels: Provide factory or field fabricated panels with applied finish and accessory items, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.
- B. Joints: Provide captive gaskets, sealants, or separator strips at panel joints to ensure weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

2.05 FINISHES

- A. 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; color and gloss as selected by Architect from manufacturer's standard line.

2.06 ACCESSORIES

- A. Miscellaneous Sheet Metal Items: Provide flashings, trim, and closure strips of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
- B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.
- C. Sealants:
 1. Exposed Sealant: See Section 07 9200.

2. Concealed Sealant: See Section 07 9200.
 3. Seam Sealant: Factory-applied, non-skinning, non-drying type.
- D. Eave Protection Membrane:
1. Protection Membrane: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.
- E. Underlayment: Synthetic non-asphaltic sheet, intended by manufacturer for mechanically fastened roofing underlayment without sealed seams.
1. Type: Woven polypropylene with anti-slip polyolefin coating on both sides.
 2. Minimum Requirements: Comply with requirements of ICC-ES AC188 for non-self-adhesive sheet.
 3. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 4. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
 5. Fasteners: As specified by manufacturer and building code qualification report or approval.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin installation of preformed metal roof panels 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. Broom clean wood sheathing prior to installation of roofing system.
- 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 pre-finished 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. Overall: 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.
 1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
 2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.
- B. Accessories: Install all components required for a complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.

- C. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.

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 074114

**SECTION 07 4213
METAL WALL PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured metal panels for exterior wall panels, with related flashings and accessory components.

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; 2020.

1.03 SUBMITTALS

- A. See Division 1 for submittal procedures.
- B. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
 - 1. Physical characteristics of components.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation instructions and recommendations.
- C. Samples: Submit two samples of wall panel and soffit panel, 12 inches by 12 inches in size illustrating finish color, sheen, and texture.
- D. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

1.04 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 installing products of the type specified in this section with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.
- C. Prevent contact with materials that may cause discoloration or staining of products.

1.06 WARRANTY

- A. See Division 1 for additional warranty requirements.

- B. Correct defective work within a five year period after Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Wall Panels - Exposed Fasteners:
 - 1. Berridge Manufacturing Company; M-Panel: www.berridge.com/#sle.
 - 2. Englert, Inc; 1.25 Inch Uniline R: www.englertinc.com/#sle.
 - 3. Petersen Aluminum Corporation; R-36 Panel: www.pac-clad.com/#sle.
 - 4. Substitutions: See Division 1.

2.02 MATERIALS

- A. Precoated Steel Sheet: 26 gauge Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating; continuous coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

2.03 FINISHES

- A. Exposed Surface Finish: Panel manufacturer's standard polyvinylidene fluoride (PVDF) coating, top coat over epoxy primer.
- B. Panel Backside Finish: Panel manufacturer's standard siliconized polyester wash coat.

2.04 ACCESSORIES

- A. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.
- B. Concealed Sealants: Non-curing butyl sealant or tape sealant.
- C. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
- D. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Fastener cap same color as exterior panel.
 - 1. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws.
- E. Field Touch-up Paint: As recommended by panel manufacturer.
- F. Bituminous Paint: Asphalt base.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building framing members are ready to receive panels.

- B. Verify that water-resistive barrier has been installed over substrate completely and correctly; see Section 07 2500.
- C. Verify that air barrier has been installed over substrate completely and correctly; see Section 07 2700.

3.02 INSTALLATION

- A. Install panels on walls and soffits in accordance with manufacturer's instructions.
- B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.
- C. Fasten panels to structural supports; aligned, level, and plumb.
- D. Locate joints over supports.
- E. Lap panel ends minimum 2 inches.
- F. Provide expansion and control joints where required.
- G. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.03 TOLERANCES

- A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.

3.04 CLEANING

- A. Remove site cuttings from finish surfaces.
- B. Remove protective material from wall panel surfaces.
- C. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

END OF SECTION 07 4213

**SECTION 07 4646
FIBER-CEMENT SIDING (ALTERNATE #2)**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiber-cement siding.

1.02 RELATED REQUIREMENTS

- A. Section 09 9000 – Painting and Coating.

1.03 REFERENCE STANDARDS

- A. ASTM C1186 - Standard Specification for Flat Fiber Cement Sheets; 2008 (Reapproved 2016).

1.04 SUBMITTALS

- A. See Division 1 for submittal procedures.
- B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
 - 1. Manufacturer's requirements for related materials to be installed by others.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods, including nail patterns.
- C. Installer's Qualification Statement.
- D. Warranty: Submit copy of manufacturer's warranty, made out in Owner's name, showing that it has been registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section with minimum three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products under waterproof cover and elevated above grade, on a flat surface.

1.07 WARRANTY

- A. See Division 1 for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 FIBER-CEMENT SIDING

- A. Panel Siding: Vertically oriented panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.
 - 1. Texture: Smooth.
 - 2. Length (Height): 96 inches, nominal.
 - 3. Width: 48 inches.
 - 4. Thickness: 5/16 inch, nominal.
 - 5. Finish: Factory applied stain.
 - 6. Warranty: 50 year limited; nontransferable.
 - 7. Products:
 - a. Allura, a division of Plycem USA, Inc: www.allurausa.com/#sle.
 - b. James Hardie Building Products, Inc: www.jameshardie.com/#sle.
 - c. Nichiha USA, Inc: www.nichiha.com/#sle.
 - d. Substitutions: See Division 1.

2.02 ACCESSORIES

- A. Trim: Same material and texture as siding.
- B. Fasteners: Galvanized or corrosion resistant; length as required to penetrate, 1-1/4 inch, minimum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrate, clean and repair as required to eliminate conditions that would be detrimental to proper installation.
- B. Verify that air barrier has been installed over substrate completely and correctly; see Section 07 2500.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations.
 - 1. Read warranty and comply with terms necessary to maintain warranty coverage.

2. Use trim details indicated on drawings.
 3. Touch up field cut edges before installing.
 4. Pre-drill nail holes if necessary to prevent breakage.
- B. Over Wood and Wood-Composite Sheathing: Fasten siding through sheathing into studs.
- C. Joints in Vertical Siding: Install Z-flashing in horizontal joints between successive courses of vertical siding.
- D. Do not install siding less than 6 inches from surface of ground nor closer than 1 inch to roofs, patios, porches, and other surfaces where water may collect.
- E. After installation, seal joints except lap joints of lap siding; seal around penetrations, and paint exposed cut edges.
- F. Finish Painting: See Section 09 9000.

3.03 PROTECTION

- A. Protect installed products until Date of Substantial Completion.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 07 4646

**SECTION 07 5300
ELASTOMERIC MEMBRANE ROOFING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Elastomeric roofing membrane, adhered conventional application.
- B. Insulation, flat and tapered.
- C. Cover boards.
- D. Flashings.
- E. Roofing cant strips, stack boots, and walkway pads.

1.02 DESCRIPTION OF WORK

- A. In general, the Work consists of:
 - 1. Fully adhered EPDM Roofing System over fully adhered 3-inch thick composite cover board panel, over fully adhered layer of 2-1/2 inch thick polyisocyanurate insulation, over roof deck as indicated on drawings.
 - 2. Stagger joints between insulation layers.
 - 3. Attach insulation with two component, heated, insulating type adhesive acceptable to the manufacturer. Apply with full coverage spray or with high pressure extrusion process at a minimum pressure of 500 psi at a maximum of 4" oc. No cold applied products or asphalt allowed.
 - 4. Design and install with a minimum wind speed warranty of 72 MPH.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of associated flashings and counterflashings installed under sections 07 62 00, Sheet Metal Flashing and Trim.
- B. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.

1.04 SUBMITTALS

- A. See Division 1 for submittal procedures.
- B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, and fasteners.
- C. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, and mechanical fastener layout. Indicate all other pertinent information required for a complete, proper, working installation.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

- E. Manufacturer's Installation Instructions: Indicate membrane seaming precautions, special procedures, and perimeter conditions requiring special attention.
- F. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer. Provide upon completion.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with manufacturer's instructions.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience, and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- B. Store materials in weather protected environment, clear of ground and moisture.
- C. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.
- D. Protect foam insulation from direct exposure to sunlight.

1.07 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather.
- B. Comply with Manufacturer's written cold and hot weather installation requirements.
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- E. Schedule applications so that no partially completed sections of roof are left exposed at end of workday.

1.08 WARRANTY

- A. See Division 1 for additional warranty requirements.
- B. Provide written certification, submitted with shop drawings, that: "All roofing components exclusive of the deck, contained in the system proposed are approved, and compatible with the warranty requirements of the roof system as specified, and that the warranty specified will be issued at completion of project if system is installed as designed."

- C. Provide 20-year, non-prorated, no dollar limit (NDL) manufacturer's material and labor warranty to cover failure to prevent penetration of water. Include all insulation, flashings and penetrations in the warranty.
- D. Warranty shall be executed by both the system manufacturer and the roofing contractor.
- E. Roofing Contractor Warranty: Provide 5 year, non-prorated, no dollar limit (NDL) contractors warranty, covering complete installation and any area of work not covered by the roof system warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. EPDM Membrane Materials:
 - 1. Basis of Design: Carlisle Roofing Systems, Inc; Sure-Seal EPDM: www.carlisle-syntec.com.
 - 2. Holcim Elevate: www.firestonebpco.com.
 - 3. Versico Roofing Systems; VersiGard EPDM: www.versico.com.
 - 4. Substitutions: See Division One.
- B. Insulation:
 - 1. Any manufacturer with products meeting these specifications and approved by the roofing manufacturer.

2.02 ROOFING - UNBALLASTED APPLICATIONS

- A. Elastomeric Membrane Roofing: One ply membrane, fully adhered, over composite cover board, composite cover board adhered over one layer of insulation, insulation fully adhered per Base Bid or mechanically fastened per Alternate Bid over roof deck.
- B. Roofing Assembly Requirements:
 - 1. Roof Covering External Fire Resistance Classification: UL (DIR) certified Class C.
 - 2. Design and install in accordance with UL 90 or FM 1-90 ratings with a minimum wind speed warranty of 72 MPH. The rating is not required though.
- C. Acceptable Insulation Types: Any type that meets requirements and is approved by membrane manufacturer for application.
 - 1. Install minimum one (1) layer of polyisocyanurate board and one (1) layer of composite cover board.
 - 2. Minimum Total Long Term Thermal Resistance (LTTR) Value of Installed Roofing Assembly: R-31.3 (U-Factor of 0.0319).

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Membrane: Ethylene-propylene-diene-monomer (EPDM); non-reinforced; complying with minimum properties of ASTM D4637/D4637M.

1. Thickness: 0.060 inch (60 mil) (1.5 mm).
 2. Sheet Width: 120 inch (3048 mm), minimum; factory-fabricate into largest sheets possible.
 3. Color: Black.
 4. **Membrane with factory-applied adhesives will not be accepted.**
- B. Seaming Tape: Provide "target" cover patches over seams at all tee intersections.
- C. Seam Cover Strips: Manufacturer's standard 6 inch pressure sensitive cover strips at all seams and flashings.
- D. Flexible Flashing Material: Same material as membrane.
1. Thickness: 60 mil.

2.04 COVER BOARDS

- A. Composite Cover Boards: Faced with high compressive strength polyisocyanurate (ISO) insulation complying with ASTM C1289, and the following characteristics:
1. Application: For installation over base layer of insulation in horizontal roofing assemblies.
 2. Classification: Type II, Class 4 - Faced with coated or uncoated polymer-bonded glass fiber mat facers on both major surfaces of the core foam.
 3. Grade and Compressive Strength: Grade 1, 80 psi (Grade 1, 551 kPa).
 4. Board Size: 48 by 96 inches (1220 by 2440 mm).
 5. Board Thickness: 3 inches.
 6. Board Edges: Square.
 7. Thermal Resistance, R-Value: 16.9 minimum, when tested in accordance with ASTM C518.
 8. Manufacturers:
 - a. Carlisle SecurShield HD Composite Polyiso; www.carlisle-syntec.com.
 - b. Substitutions: See Division One.
- B. Standard Cover Board: Faced with high compressive strength polyisocyanurate (ISO) insulation complying with ASTM C1289, and the following characteristics:
1. Application: For use at parapets, against existing buildings, and other miscellaneous applications where non-composite cover boards are indicated on drawings.
 2. Classification: Type II, Class 4 - Faced with coated or uncoated polymer-bonded glass fiber mat facers on both major surfaces of the core foam.
 3. Grade and Compressive Strength: Grade 1, 109 psi.

4. Board Size: 48 by 96 inches (1220 by 2440 mm) or as required for project conditions and application.
5. Board Thickness: 1/2 inch.
6. Board Edges: Square.
7. Thermal Resistance, R-Value: 2.5 minimum, when tested in accordance with ASTM C518.
8. Manufacturer
 - a. Carlisle SecurShield HD Plus Polyiso; www.carlisle-syntec.com.
 - b. Substitutions: See Division One.

2.05 INSULATION

- A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
 1. Classifications:
 - a. Type II:
 - 1) Class 1 - Faced with glass fiber reinforced cellulosic felt facers on both major surfaces of core foam.
 - 2) Compressive Strength: Grade 2 - 20 psi minimum.
 - 3) Thermal Resistance, Long Term Thermal Resistance Value (LTTR): 6.0 per inch of thickness, minimum; **14.4 total LTTR.**
 2. Board Size: 48 by 96 inch (1220 by 2440 mm).
 3. Board Thickness: 2.5 inch (50 mm).
 4. Pre-Cut Tapered Board: Slope as indicated; minimum thickness 1/2 inch; fabricate of fewest layers possible.
 5. Board Edges: Square.
 6. Any manufacturer with products meeting these specifications and approved by the roofing manufacturer.

2.06 ACCESSORIES

- A. Pre-Cast Concrete Splash Blocks: Manufacturer's standard 12" x 30" x 4" commercial precast concrete splashblocks.
- B. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.
- C. Cant and Edge Strips: Perlite board, compatible with roofing materials; cants formed to 45 degree angle, tapered edge strips, and other configurations as detailed.

- D. Sheathing Adhesive: Noncombustible type, for adhering gypsum sheathing to metal deck.
- E. Sheathing Joint Tape: Paper type, 2 inch (5.0 mm) wide, self-adhering.
- F. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches (150 mm) wide; self-adhering.
- G. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
 - 1. Length as required for thickness of insulation material and penetration of deck substrate, with metal washers.
- H. Membrane Adhesive: As recommended by membrane manufacturer.
- I. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.
- J. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.
- K. Insulation Adhesive: As recommended by insulation manufacturer.
- L. Termination Bar: 1" wide x 0.098 thick extruded aluminum bar, pre-punched @ 6" o.c.; provide angled sealant ledge to support sealant and to provide increased stability for membrane terminations.
- M. Sealants: As recommended by membrane manufacturer.
- N. Walkway Pads: Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane.
 - 1. Composition: Roofing membrane manufacturer's standard.
 - 2. Size: 18 by 18 inch (460 by 460 mm).
 - 3. Surface Color: Black.
 - 4. Location: See roof plans for locations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 PREPARATION - WOOD DECK

- A. Verify condition of wood deck to remain prior to beginning work.
- B. Complete all deck patching and roof recover board installation prior to installation of new roofing systems.
- C. Verify flatness and tightness of joints of wood decking. Fill knot holes with latex filler.
- D. Confirm dry deck by moisture meter with 12 percent moisture maximum.

3.03 MEMBRANE APPLICATION

- A. Apply elastomeric membrane roofing system in accordance with manufacturer's Membrane with factory-applied adhesives will not be accepted.recommendations and NRCA (WM) applicable requirements.
- B. **Membrane with factory-applied adhesives will not be accepted.**
- C. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration. Complete an acceptable membrane seal in accordance with the manufacturer's requirements.
- D. Unroll and position membrane without stretching. Allow the membrane to relax for approximately 1/2 hour before bonding. Fold the sheet back onto itself so half the underside of the membrane is exposed.
- E. Apply the Bonding Adhesive in accordance with the manufacturer's published instructions, to both the underside of the membrane and the substrate. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.
 - 1. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded half of the membrane sheet with a soft bristle push broom to achieve maximum contact.
 - 2. Fold back the unbonded half of the membrane sheet and repeat the bonding procedure.
- F. Install adjoining membrane sheets in the same manner, overlapping edges approximately 4 inches. Do not apply bonding adhesive to the splice area.
- G. Shingle joints on sloped substrate in direction of drainage.
- H. Membrane Splicing:
 - 1. Install 6 inch wide pressure sensitive cover strip over ALL splices. Field splices at roof drains must be located outside the drain sump.
 - 2. For 20-year or longer System Warranty, splice enhancements are required. Refer to Carlisle Sure-Seal Roofing System Specification.
 - 3. Position membrane sheet to allow for required splice overlap. Mark the bottom sheets with an indelible marker approximately 1/4" to 1/2" from the top sheet edge. The pre-marked line on the membrane edge can also be used as a guide for positioning splice tape.
 - 4. Fold the top sheet back and clean the dry splice area (minimum 3" wide) of both membrane sheets by scrubbing with clean natural fiber rags saturated with Sure-Seal Primer. When using Sure-Seal

(black) PRE-KLEENED membrane, cleaning the splice area is not required unless contaminated with field dirt or other residue.

5. Apply Sure-Seal HP 250 Primer to splice area.
 6. Apply SecurTAPE in accordance with the manufacturer's specifications and roll the top sheet onto the mating surface.
 7. When adhering Factory Applied Tape (FAT), pull the poly backing from FAT beneath the top sheet and allow the top sheet to fall freely onto the exposed primed surface. Press top sheet on to the bottom sheet using firm even hand pressure across the splice towards the splice edge.
 8. Immediately roll the splice using positive pressure when using a 2" wide steel roller. Roll across the splice edge, not parallel to it. When FAT is used, Carlisle's Stand-Up Seam Roller can be used to roll parallel to the splice edge.
 9. At all field splice intersections, apply Lap Sealant along the edge of the membrane splice to cover the exposed SecurTAPE 2" in each direction from the splice intersection. Install Carlisle's Pressure-Sensitive "T" Joint Covers or a 6" wide section (with rounded corners) of Sure-Seal Pressure-Sensitive Flashing over the field splice intersection.
- I. Install 6 inch wide pressure sensitive cover strip over ALL seams, flashing joints, and flashing flanges.
- J. At intersections with vertical surfaces:
1. Extend membrane up a minimum of 8 inches onto vertical surfaces.
 2. Fully adhere flexible flashing over membrane and up to nailing strips or other means of securement recommended by Roofing System Manufacturer.
 3. Secure flashings as recommended by Roofing System Manufacturer.
- K. Around roof penetrations, seal flanges and flashings with flexible flashing.
- L. Coordinate installation of roof drains and sumps and related flashings.
- M. Coordinate installation of associated counterflashings installed under other sections.
- N. Install walkway pads where shown on drawings. Space pad joints to permit drainage.

3.04 FIELD QUALITY CONTROL

- A. See Division One for general requirements for field quality control and inspection.
- B. Require site attendance of roofing systems material manufacturer's representative periodically during installation of the Work to ensure compliance with installation procedures in accordance with the Roofing System Manufacturer's requirements.
1. A minimum of four visits during construction is required (including warranty inspection).
 2. Furnish written reports of manufacturer observations to the Architect.

3. 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.

3.05 CLEANING

- A. Remove any markings from finished surfaces.
- B. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- C. Repair or replace defaced or damaged finishes caused by work of this Section.
- D. 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.

3.06 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces from damage with 1/2 inch plywood over 1-1/2 inch polystyrene insulation, or other method approved in writing by Architect.

END OF SECTION 07 5300

**SECTION 07 6200
SHEET METAL FLASHING AND TRIM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters downspouts and miscellaneous sheet metal items shown on drawings, not specified elsewhere.
- B. Reglets and accessories.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.
- B. Require attendance of all parties directly affecting work of this section. Notify the Architect one week prior to the scheduled meeting.
- C. Review conditions of installation, installation procedures, and coordination with related work.

1.03 SUBMITTALS

- A. See Division One for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Samples: Submit two sample sets 2x2 inch in size illustrating Manufacturer's full range of metal finish colors available.
- D. Sample Warranty: Submit sample of Manufacturer's standard 20 year finish warranty.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

1.05 WARRANTY

- A. See Division One for University of Missouri Roof System Manufacturers Certification and University of Missouri Contractors Roofing/Flashing/Sheet Metal Guarantee.

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 SHEET MATERIALS

- A. Pre-Finished Steel: ASTM 792-08, Grade 40 Steel with ASTM A792, AZ-55 aluminum-zinc alloy coating (Galvalume); 24 GA.minimum 0.02 inch (24 GA) thick base metal, shop pre-coated with PVDF coating.
 - 1. PVDF (Polyvinylidene Fluoride) Coating: Kynar 500, with a top side dry film thickness of 0.75 +/- 0.05 mil over 0.20 +/- .05 mil prime coat, with a total top side dry film thickness of 0.95 +/- 0.10 mil. Bottom side coated with primer and urethane coating for a total dry film thickness of 0.35 +/- 0.05 mil.
 - 2. Color: Selected by Architect from manufacturers full range of standard colors.
- B. Stainless Steel Drip Edge/Pan Flashing for Masonry Veneer- Coordinate with Section 04 2001: ASTM A666 Type 304, soft temper,.019 inch thick, (26 GA equivalent); smooth 2B finish.

2.02 ACCESSORIES

- A. Fasteners: Same material and finish as flashing metal.
- B. Underlayment: ASTM D226, organic roofing felt, Type II ("No. 30").
- C. Primer: manufacturers recommended type.
- D. Protective Backing Paint: manufacturers recommended type.
- E. Sealant: Specified in Section 07 90 05.
- F. Sealant: Type E2 specified in Section 07 90 05 for concealed sheet metal joints, Type E1, for any exposed sealant such as tops of reglets.
- G. Reglets: Surface mounted where shown on drawings, with hemmed receiver for sealant and backer at top of reglet.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats of same material as sheet, minimum 4 inches wide, interlocking with sheet.
- C. Form pieces in longest possible lengths. with a minimum of 5'-0" and a maximum of 10'-0".
- D. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- E. Form material with wide hooked flat seams with at least one inch of sealant, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- F. Joints and seams: Use locks and seams recommended by appropriate SMACNA standard for item being joined. Set in compatible sealant as specified in Section 07 90 05. Allow joint to move.
- G. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

H. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

2.04 DRIP EDGE/ PAN FLASHING- COORDINATE WITH SECTION 04 2001 UNIT MASONRY

- A. Fabricate as described in 2.03 above and as detailed on drawings.
- B. Lap and "bayonet" seams a minimum of 4 inches and seal watertight.
- C. Solder or weld seams at inside and outside corners. All other seams may be sealed, soldered or welded at Contractors option.

2.05 GUTTER AND DOWNSPOUT FABRICATION

- A. Gutters: See drawings for profile.
- B. Downspouts: 4" x 5" Corrugated.
- C. Accessories: Profiled to suit downspouts.
 - 1. Downspout Supports: Straps.
 - 2. Downspout Boots: PVC with square transition for insertion.
- D. Seal metal joints.

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.
- C. Verify that masonry and other related work is completed in an acceptable condition to receive stainless steel flashing. Coordinate with Section 04 2001, Masonry Veneer.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant and backer.
- C. Back paint concealed metal surfaces other than stainless steel with protective backing paint to a minimum dry film thickness of 15 mil. Manufacturers standard back paint on pre- finished sheet metal items are acceptable in lieu of field back painting.

3.03 INSTALLATION

- A. Conform to drawing details and/ or SMACNA standards, whichever is most stringent.
- B. Insert flashings into reglets to form tight fit. Secure in place with malleable wedges. Seal flashings into reglets with sealant specified in Section 07 90 05.

- C. Secure flashings in place using concealed cleats and fasteners, unless otherwise detailed.
- D. Apply plastic cement compound between metal flashings and felt flashings.
- E. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- F. Seal metal joints watertight with sealant specified in Section 07 90 05.

END OF SECTION 07 6200

**SECTION 07 8400
FIRESTOPPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of all joints and penetrations in fire-resistance rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.
- C. Coordination with Divisions 21 through Division 28 work.

1.02 SUBMITTALS

- A. See Division One for Submittal Procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Installer Qualification: Submit qualification statements for installing mechanics.

1.03 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with ASTM E814.
 - 1. Listing in the current-year classification or certification books of UL, FM, or ITS (Warnock Hersey) 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 the manufacturer.

1.04 MOCK-UP

- A. Install one firestopping assembly representative of each fire rating design required on project.

1. Where one design may be used for different penetrating items or in different wall or floor constructions, install one assembly for each different combination.
 2. Where firestopping is intended to fill a linear opening, install minimum of 1 linear ft.
- B. If accepted, mock-up will represent minimum standard for the Work.
- C. If accepted, mock-up may remain as part of the Work. Remove and replace mock-ups not accepted.

1.05 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 FIRESTOPPING - GENERAL REQUIREMENTS

- A. Manufacturers:
1. 3M Fire Protection Products: www.3m.com/firestop.
 2. Hilti, Inc: www.us.hilti.com.
 3. Nelson FireStop Products: www.nelsonfirestop.com.
 4. Specified Technologies, Inc: www.stifirestop.com.
 5. Substitutions: See Division One.
- B. Firestopping: Any material meeting requirements.
- C. Materials: Use any material meeting requirements.
- D. Firestopping Materials with Volatile Content: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- E. Mold Resistance: Provide firestopping materials with mold and mildew resistance rating of 0 as determined by ASTM G21.
- F. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.
- G. Fire Ratings: See Drawings.

2.02 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Head-of-Wall Firestopping at Joints Between Non-Rated Floor and Fire-Rated Wall: Use any system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.

1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.
- B. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use any system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
 1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.
 2. Listing by UL, FM, or Intertek in their certification directory will be considered evidence of successful testing.
- C. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
 1. Listing by UL, FM, or Intertek in their certification directory will be considered evidence of successful testing.

2.03 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 1. Fire Ratings: Use any system listed by UL or tested in accordance with ASTM E814 that has F Rating equal to fire rating of penetrated assembly and T Rating Equal to F Rating and that meets all other specified requirements.

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 matter that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install damming materials to arrest liquid material leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by Owners Representative.
- C. Install labeling required by code.

3.04 FIELD QUALITY CONTROL

- A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174, “Standard Practice for On-Site Inspection of Installed Fire Stops and ASTM E2393, “Standard Practice for On-Site Inspection of Installed Fire Stop Joint Systems.
- B. 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 8400

**SECTION 07 9005
JOINT SEALERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sealants, joint backing, and bond breakers.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with other sections referencing this section.

1.03 SUBMITTALS

- A. See Division One, for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- C. Samples: Submit two sets of samples, 1/4 inch dia. x 2 inch in size illustrating Manufacturer's full range of sealant colors.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

1.04 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum ten years documented experience.
- C. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

1.05 MOCK-UP

- A. Provide mock-up of sealant joints. Coordinate with Section 04 43 01.
- B. Construct mock-up with specified sealant types and with other components noted.
- C. Locate where directed.
- D. Mock-up may not remain as part of the Work.

1.06 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.07 WARRANTY

- A. Correct defective work within a two year period after Date of Substantial Completion.

- B. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 SEALANTS

- A. Type E- 1 - General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25, Uses M, G, and A; single or multi- component.
 - 1. Color: To be selected by Architect from manufacturer's standard range.
 - 2. Applications: Use for:
 - a. Control, expansion, and soft joints in masonry.
 - b. Joints between concrete and other materials.
 - c. Joints between metal frames and other materials.
 - d. Other exterior joints for which no other sealant is indicated.
- B. Type E-2 - Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
 - 1. Applications: Use for:
 - a. Concealed sealant bead in sheet metal work.
- C. Type I-1 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
 - 1. Color: To be selected by Architect from manufacturer's standard range.
 - 2. Applications: Use for:
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.
- D. Type I-2 - Bathroom/Tile Sealant: Silicone; ASTM C920, Uses I, M and A; single component, mildew resistant.
 - 1. Applications: Use for:
 - a. Joints between plumbing fixtures and floor and wall surfaces.
 - b. Joints between kitchen and bathroom countertops and wall surfaces.
- E. Type I-3 - Acoustical Sealant: Butyl or acrylic sealant; ASTM C920, Grade NS, Class 12-1/2, Uses M and A; single component, solvent release curing, non-skinning.

1. Applications: Use for concealed locations only:
 - a. Sealant bead between top stud runner and structure and between bottom stud track and floor.
 - b. Sealant between top of gypsum wall board and structure and bottom of gypsum wall board and structure.
 - c. Where noted on drawings.
- F. Type E-3 - Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, I, M and A; single or multi-component.
 1. Color: To be selected by Architect from Manufacturer's full range.
 2. Applications: Use for:
 - a. Joints in sidewalks and vehicular paving.
- G. Type G-1 - Silicone Sealant: ASTM C920, Grade NS, Class 25, Uses NT, A, G, M, O; single component, solvent curing, non-sagging, non-staining, fungus resistant, non-bleeding.
 1. Color: To be selected by Architect from manufacturer's standard range.
 2. Movement Capability: Plus and minus 25 percent.
 3. Service Temperature Range: -65 to 180 degrees F.
 4. Shore A Hardness Range: 15 to 35.
 5. Applications: Use for:
 - a. All glazing operations.

2.02 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; closed cell polyethylene; oversized 30 to 50 percent larger than joint width; Standard Backer Rod manufactured by Sandell Manufacturing Company, Inc; www.sandellmfg.com.
 1. Substitutions: See Division One.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces and joint openings are ready to receive work.

- B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Mask joints if necessary to keep adjacent surfaces not scheduled to receive sealant clean.
- D. Perform acoustical sealant application work in accordance with ASTM C919.
- E. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.
- F. Install bond breaker where joint backing is not used.
- G. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- H. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- I. Tool joints flush.

3.04 CLEANING

- A. Clean adjacent surfaces of excess sealant and smears as a result of this work, before the sealant cures.
- B. Repair joints that have shrunk, sagged, run, and that have thin spots or other defects.
- C. Leave adjacent surfaces in as good or better condition as they were before sealant operations.

3.05 PROTECTION

- A. Protect sealants until cured.

3.06 SCHEDULE

- A. See Drawings for designated sealant joints.
- B. Exterior Joints for Which No Other Sealant Type is Indicated: Type E-1.
- C. Control and Expansion Joints in Paving: Type E-3.

- D. Exterior Wall Expansion Joints: Type E-1.
- E. Joints Between Concrete Panels and Between Panels and Adjacent Work: Type E-1.
- F. Control, Expansion, and Soft Joints in Masonry, and Between Masonry and Adjacent Work: Type E-1.
- G. Lap Joints in Exterior Sheet Metal Work: Type E-2.
- H. Joints Between Exterior Metal Frames and Adjacent Work: Type E-1.
- I. Under Exterior Door Thresholds: Type E-1.
- J. Interior Joints for Which No Other Sealant is Indicated: Type I-1.
- K. Control and Expansion Joints in Interior Concrete Slabs and Floors: Type E-3.
- L. Joints Between Plumbing Fixtures and Walls and Floors, and Between Countertops and Walls: Type I-2.
- M. In STC-Rated Walls, Between Metal Stud Track/Runner and Adjacent Construction and Between Outlet Boxes and Gypsum Board: Type I-3.
- N. Joints in Curtain Walls, Storefront and Glazing: Type G-1.

END OF SECTION 07 9005

SECTION 08 1113 HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire rated and Non-fire-rated steel doors and frames.
- B. Steel frames for wood doors.
- C. Fire-rated steel doors and frames.
- D. Storm Rated Doors and Frames.
- E. Sound-rated hollow metal doors and frames.
- F. Steel glazing frames.
- G. Accessories, including other items required for a complete proper installation and other items required for a complete proper installation.

1.02 REFERENCE STANDARDS

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2017.
- 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; 2020.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021a.
- G. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.
- H. FEMA P-361 - Safe Rooms for Tornadoes and Hurricanes: Guidance for Community and Residential Safe Rooms; 2015.
- I. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2007.
- J. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.
- K. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.
- L. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

- M. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- N. FEMA 361 - 2008 - Design and Construction Guidance for Community Shelters: October 2008 Version

1.03 SUBMITTALS

- A. See Division 1 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. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- B. Maintain at the project site a copy of all reference standards dealing with installation.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store in accordance with NAAMM HMMA 840.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Steel Doors and Frames:
 - 1. Assa Abloy Ceco: www.assaabloydss.com/#sle.
 - 2. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
 - 3. Steelcraft, an Allegion brand: www.allegion.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS AND FRAMES

- A. Requirements for All Doors and Frames:
 - 1. Accessibility: Comply with ANSI/ICC A117.1.
 - 2. Door Top Closures: Flush with top of faces and edges.
 - 3. Door Edge Profile: Beveled on both edges.

4. Door Texture: Smooth faces.
 5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
 6. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
 7. Galvanizing for exterior openings: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturers standard coating thickness with A40/ZF120 being the minimum thickness allowed.
 8. Finish: Factory primed, for field finishing.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all 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 STEEL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Exterior Doors :
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - 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.
 - d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
 - e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
 2. Door Core Material: Polyurethane, 1.8 lbs/cu ft minimum density.
 3. Door Thermal Resistance: R-Value of 8.7 minimum for installed thickness of polyurethane.
 4. Door Thickness: 1-3/4 inch, nominal.
 5. Top Closures for Outswinging Doors: Flush with top of faces and edges.
 6. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness with A40/ZF 120 being the minimum thickness allowed.
 7. Weatherstripping: Refer to Section 08 7100.
 8. Door Finish: Factory primed and field finished.
- C. Interior Doors , Non-Fire-Rated:

1. Grade: ANSI A250.8 Level 2, physical performance Level B, Model 2, seamless.
 - a. Level 2 - Heavy-duty.
 - b. Model 1 - Full Flush.
2. Core: manufacturers standard core that meets referenced standards.
3. Thickness: 1-3/4 inches.
4. Door Finish: Factory primed and field finished.

D. Interior Doors , Fire-Rated:

1. Grade: ANSI A250.8 Level 2, physical performance Level B, Model 2, seamless.
 - a. Level 2 - Heavy-duty.
 - b. Model 1 - Full Flush.
 - c. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
2. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C ("positive pressure").
 - a. Provide units listed and labeled by UL.
 - b. Attach fire rating label to each fire rated unit.
3. Core: manufacturers standard to achieve required rating and UL label.
4. Door Thickness: 1-3/4 inch, nominal.
5. Door Finish: Factory primed and field finished.
6. Door Thickness: 1-3/4 inches, nominal.
7. Door Finish: Factory primed and field finished.

2.04 STEEL FRAMES

A. Frame Finish: Factory primed and field finished.

B. General:

1. Comply with the requirements of grade specified for corresponding door, except:
 - a. Frames for Wood Doors: Comply with frame requirements specified in ANSI A250.8 for Level 2
2. Finish: Same as for door.
3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

- C. Exterior Door Frames: Fully welded.
 - 1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness with A40/2F 120 being the minimum thickness.
 - 2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
- D. Interior Door Frames , Non-Fire-Rated: Face welded type.
 - 1. Frame Metal Thickness: 18 gage, 0.042 inch, minimum.
- E. Interior Door Frames , Fire-Rated: Face welded type.
 - 1. Frame Metal Thickness: 18 gage, 0.042 inch, minimum.
- F. Tornado-Resistant Door Frames: With same tornado resistance as door; face welded or full profile/continuously welded construction, ground smooth, fully prepared and reinforced for hardware installation.
 - 1. Frame Metal Thickness: 14 gage, 0.067 inch, minimum.
 - 2. Frame Finish: Factory primed and field finished.
- G. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, and as indicated on drawings.
- H. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- I. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inch high to fill opening without cutting masonry units.
- J. Glazing: As specified in Section 08 8000 .
- K. Removable Stops: Wrap around, Formed sheet steel, mitered or butted corners; prepared for countersink style tamper proof screws.
- L. Grout for Exterior Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.
- M. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
- N. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.05 FINISH MATERIALS

- A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard that meets referenced standards including LEED.

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 INSTALLATION

- A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- B. In addition, 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. Coordinate installation of hardware.
- F. Coordinate installation of glazing.
- G. Coordinate installation of electrical connections to electrical hardware items.
- H. Touch up damaged factory finishes.

3.03 TOLERANCES

- A. Clearances Between Door and Frame: As specified in ANSI A250.8.
- B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.04 ADJUSTING

- A. Adjust for smooth and balanced door movement.
- B. Adjust sound control doors so that seals are fully engaged when door is closed.
- C. Test sound control doors for force to close, latch, and unlatch; adjust as required to comply.

3.05 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION 08 1113

**SECTION 08 1416
FLUSH WOOD DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors, transoms where shown on drawings; flush and flush glazed configuration; fire rated and non-rated.

1.02 SUBMITTALS

- A. See Division One 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.
 - 1. Provide the information required by AWI/AWMAC/WI Architectural Woodwork Standards.
- D. Specimen warranty.
- E. Samples: Submit two samples of door veneer, 10 x 10 inch in size illustrating wood grain, stain color, and sheen.
- F. Manufacturer's Installation Instructions: Indicate special installation instructions.
- G. Warranty, executed in Owner's name at completion of work.

1.03 QUALITY ASSURANCE

- A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of experience.
- C. Installed Fire Rated Door and Transom Assembly: Conform to NFPA 80 for fire rated class as scheduled.

1.04 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.

1.05 WARRANTY

- A. Interior Doors: Provide manufacturer's warranty for the life of the installation.

- B. 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. Tru-Door: <https://www.trudoor.com>
 - 2. Graham Wood Doors: www.grahamdoors.com.
 - 3. VT Industries: www.vtindustries.com.
 - 4. Substitutions: See Division One.

2.02 DOORS

- A. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at all locations
 - 2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with International Building Code (IBC) - Positive Pressure; Underwriters Laboratories Inc. (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open (conceal required intumescent in door edge).

2.03 DOOR FACINGS

- A. Factory finished, Color: Plain sliced White Maple, Clear Coat, meeting or exceeding WDMA TR-6. WDMA, Premium, with "A" grade veneer, Rift cut, balance matched.
 - 1. Vertical Edges: Same species as face veneer.
 - 2. Pairs: Pair match each pair; set match pairs within 10 feet of each other when doors are closed.
- B. Facing Adhesive: Type I - waterproof.

2.04 ACCESSORIES

- A. Glazing Stops: Wood, of same species as door facing, mitered corners; prepared for countersink style tamper proof screws.
- B. Glazing: As specified in Section 08 8000.

2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard of basis of design product specified.
- B. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

- C. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- D. Provide edge clearances in accordance with the quality standard specified.

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.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Coordinate installation of glazing, with Section 08 80 00.

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 - SEE DRAWINGS

END OF SECTION 08 1416

**SECTION 08 3100
ACCESS DOORS AND PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall access door and frame units.
- B. Ceiling access door and frame units.
- C. Coordinate with Divisions 21 through 28, work and MEP drawings and specifications for access panel locations.

1.02 SUBMITTALS

- A. See Division One, for submittal requirements.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of all access door units.
- D. Manufacturer's Installation Instructions: Indicate installation requirements and rough-in dimensions.
- E. Project Record Documents: Record actual locations of all access units.

PART 2 PRODUCTS

2.01 ACCESS DOOR AND PANEL APPLICATIONS

- A. Walls, Unless Otherwise Indicated on drawings:
 - 1. Material: Steel.
 - 2. Size: 12 x 12 inches, unless otherwise indicated on drawings.
 - 3. Standard duty, hinged door.
 - 4. Tool-operated spring or cam lock; no handle.
 - 5. In All Wall Types: Surface mounted face frame and door surface flush with frame surface.
 - 6. Prime coat with manufacturers gray primer; field finish to match adjacent surface. Coordinate with Section 09 9000.
- B. Walls in Wet Areas such as toilets, Janitors closets unless otherwise indicated on drawings:
 - 1. Material: Steel, hot-dipped zinc or zinc-aluminum-alloy coated.
 - 2. Size: 12 x 12 inches, unless otherwise indicated on drawings.
 - 3. Standard duty, hinged door.
 - 4. Tool-operated spring or cam lock; no handle.

5. In All Wall Types: Surface mounted face frame and door surface flush with frame surface.
 6. Prime coat with manufacturers gray primer; field finish to match adjacent surface. Coordinate with Section 09 9000.
- C. Fire Rated Walls and Ceilings, unless otherwise indicated on drawings: See drawings for wall fire ratings and locations
1. Material: Steel.
 2. Size: 12 x 12 inches, unless otherwise indicated on drawings.
 3. Uninsulated, single thickness door panel.
 4. Tool-operated spring or cam lock; no handle.
 5. Prime coat with manufacturers gray primer; field finish to match adjacent surface. Coordinate with Section 09 90 00.
- D. Ceilings, Unless Otherwise Indicated on drawings : Same type as for walls.
1. Material: Steel.
 2. Size: 12 x 12 inches, unless otherwise indicated on drawings.
 3. Standard duty, hinged door.
 4. Tool-operated spring or cam lock; no handle.
 5. Prime coat with manufacturers gray primer; field finish to match adjacent surface. Coordinate with Section 09 9000.

2.02 WALL AND CEILING UNITS

- A. Manufacturers:
1. Best Access Doors: www.bestaccessdoors.com
 2. Acudor Products Inc: www.acudor.com.
 3. Karp Associates, Inc: www.karpinc.com.
 4. Substitutions: See Division One.
- B. Access Doors: Factory fabricated door and frame units, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.
1. Style: As indicated.
 2. Door Style: Single thickness with rolled or turned in edges.
 3. Heavy Duty Frames: 14 gage, 0.0747 inch, minimum.

4. Heavy Duty Single Thickness Steel Door Panels: 14 gage, 0.0747 inch, minimum.
5. Units in Fire Rated Assemblies: Fire rating as required by applicable code for the fire rated assembly in which they are to be installed.
6. Provide products listed and labeled by UL or ITS (Warnock Hersey) as suitable for the purpose specified and indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings. Secure rigidly in place.
- C. Position units to provide convenient access to the concealed work requiring access.

END OF SECTION 08 3100

SECTION 08 3323
EXTERIOR OVERHEAD COILING DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead coiling doors , operating hardware, exterior, electric operation.
- B. Wiring from electric circuit disconnect to operator to control station.

1.02 REFERENCE STANDARDS

- A. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- B. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000, with Errata (2008).
- C. NEMA MG 00001 - Motors and Generators; 2024.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Division 1 for submittal procedures.
- B. Product Data: Provide general construction, component connections and details, electrical equipment and manual operating equipment.
- C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- D. Samples: Submit two slats, 2 x 2 inch in size illustrating shape, color and finish texture.
- E. Manufacturer's Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures and other applicable operating data.
- F. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Overhead Coiling Doors:

1. C.H.I. Overhead Doors; Model 6242: www.chiohd.com/#sle.
2. Clopay Building Products; Model CERD20: www.clopaydoor.com/#sle.
3. Cornell Iron Works, Inc; Product Model ESD20: www.cornelliron.com/#sle.
4. Substitutions: See Division 1.

2.02 COILING DOORS

A. Exterior Coiling Doors: Steel slat curtain.

1. Capable of withstanding positive and negative wind loads of 20 psf, without undue deflection or damage to components.
2. Sandwich slat construction with insulated core of [Urethane] type insulation; insulation (u-) value: 0.50 BTU/hr sq ft deg F (2.84 W/sq m deg K)
3. Nominal Slat Size: 2 inches wide x required length.
4. Finish: Factory painted over galvanized steel, color as selected.
5. Guides: Angles; galvanized steel.
6. Hood Enclosure: Manufacturer's standard; primed steel.
7. Manual hand chain lift operation.
8. Electric operation.
9. Mounting: Within framed opening.
10. Exterior lock and latch handle.

2.03 MATERIALS

A. Curtain Construction: Interlocking slats.

1. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
2. Weatherstripping: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.

B. Steel Slats: Minimum 18 gage ASTM A653/A653M galvanized steel sheet.

1. Galvanizing: Minimum G90/Z275 coating.

- C. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- D. Steel Guides: Formed from galvanized steel sized to suit application and loading.
- E. Hood Enclosure: Internally reinforced to maintain rigidity and shape.
- F. Hardware:
 - 1. Lock Cylinders: Specified in Section 08 7100.
 - 2. For motor operated units, additional lock or latching mechanisms are not required.
 - 3. Latching: Inside mounted, adjustable keeper, spring activated latch bar with feature to keep in locked or retracted position.
 - 4. Latch Handle: Interior and exterior handle.
- G. Roller Shaft Counterbalance: Steel pipe and helical 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: Comply with UL 325; provide products listed by a testing agency acceptable to authorities having jurisdiction.
 - 1. Mounting: Side mounted.
 - 2. Motor Enclosure:
 - a. Exterior doors: NEMA MG 00001 Type 4; open drip proof.
 - 3. Motor Rating: 1/2 hp; continuous duty.
 - 4. Controller Enclosure: NEMA EN 10250 Type 1.
 - 5. Opening Speed: 12 inches per second.
 - 6. Brake: Adjustable friction clutch type, activated by motor controller.
 - 7. Provide for remote control of motor for each door.
- B. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.
- C. Control Station: Standard three button (OPEN-STOP-CLOSE) momentary control for each operator.
 - 1. Surface mounted, at interior door jamb.
 - 2. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.

- D. Safety Edge: Located at bottom of curtain, full width, electro-mechanical sensitized type, wired to stop operator upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

- A. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- B. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 9005.
- C. Install Seals.

3.03 TOLERANCES

- A. Maximum Variation From Plumb: 1/16 inch.
- B. Maximum Variation From Level: 1/16 inch.
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

END OF SECTION 08 3323

**SECTION 08 5200
WOOD WINDOWS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Factory fabricated wood windows.
- B. Glazing.
- C. Operating hardware.
- D. Insect screens.
- E. Wood trim for exterior finishing.

1.02 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights; 2017.
- B. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products; 2012.
- C. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2018).
- D. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

1.03 SUBMITTALS

- A. See Division 1 for submittal procedures.
- B. Product Data: Show component dimensions, anchorage and fasteners, glass, and internal drainage details .
- C. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, and installation requirements.
- D. Manufacturer's Certificate: Certify that products furnished meet or exceed specified requirements.
- E. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.
- H. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than three years of documented experience.
- 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. Protect factory finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.06 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and after installation of sealants.

1.07 WARRANTY

- A. See Division 1 for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same.
- D. Warranty: Include coverage for the following:
 - 1. Degradation of color finish.
 - 2. Delamination or separation of finish cladding from window member.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Windows:
 - 1. Pella Corp; Lifestyle Series: www.pellacommercial.com/#sle.
 - 2. Andersen Windows, Inc;400 series: www.andersenwindows.com/#sle.
 - 3. Marvin Windows; Ultimate Casement Windows: <https://www3.marvin.com>
 - 4. Substitutions: See Division 1

2.02 WOOD WINDOWS

- A. Wood Windows: Wood frame and sash, factory fabricated and assembled.
 - 1. Exterior Finish: Metal clad, painted.
 - 2. Interior Finish: Pre-Finished Stain finish.

3. Color: As selected by Architect from manufacturer's standard range.
4. Configuration: As indicated on drawings.
5. Wood Species: Clear pine, preservative treated using treatment type suitable for required finish.
6. Frame and Sash Members: Mortise and tenon joints. Glue and steel pin joints to hairline fit, weather tight.
7. Metal Cladding: Formed aluminum, factory finished, factory fit to profile of wood members.
8. Weather Stop Flange: Continuous at perimeter of unit.
9. Internal Drainage of Glazing Spaces to Exterior: Weep holes.
10. Insect Screen: Locate on inside of windows.
11. Operable Units: Double weatherstripped.

2.03 COMPONENTS

- A. Glazing: Double glazed, clear, Low-E coated, argon filled, with glass thicknesses as recommended by manufacturer for specified wind conditions.
- B. Frames: Manufacturer standard profile; flush solid wood glass stops of screw fastened type, sloped for positive drainage.
- C. Sills: Extruded aluminum, sloped for positive drainage; fits under sash and projects at least 1/2 inch beyond exterior face of wall; single piece full width of opening.
- D. Wood; fit under sash to project 1/2 inch beyond interior wall face; one piece full width of opening.
- E. Insect Screens: Extruded aluminum frame with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable supports allowing screen removal without use of tools.
 1. Supports: Spring-loaded steel pins; four per screen unit.
 2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's standard mesh.
 3. Frame Finish: Baked enamel, color to match window interior color.
- F. Operable Sash Weatherstripping: Wool pile; permanently resilient, profiled to effect weather seal.
- G. Fasteners: Stainless steel.
- H. Sealant and Backing Materials: See Section 07 9005 of types as indicated.
- I. Wood for Casings and Trim: Clear pine, clear preservative treated, of type suitable for required finish.
- J. Flashing: Provide related flashings, with necessary anchors and attachment devices.
- K. Sealant for Setting Sills, Stools, Aprons, and Sill Flashing: Non-curing butyl type.

2.04 PERFORMANCE REQUIREMENTS

- A. Comply with AAMA/WDMA/CSA 101/I.S.2/A440 requirements for the specific window type in accordance with the following:
 - 1. Performance Class (PC): LC.
- B. Design Pressure (DP): In accordance with applicable codes.

2.05 HARDWARE

- A. Sash lock: Lever handle with cam lock.
- B. Operator: Lever action handle fitted to projecting sash arms with limit stops; baked enamel finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify wall openings and adjoining water-resistive barrier materials are ready to receive wood windows; see Section 07 2500.

3.02 INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Install sills, stools, and aprons.
- E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Install operating hardware.

3.03 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inch per 3 ft non-cumulative or 1/8 inch per 10 ft, whichever is less.

3.04 FIELD QUALITY CONTROL

- A. Provide field testing of installed wood windows by independent laboratory in accordance with AAMA 502 and AAMA/WDMA/CSA 101/I.S.2/A440 during construction process and before installation of interior finishes.
 - 1. Field test for water penetration in accordance with ASTM E1105 using Procedure B - cyclic static air pressure difference; test pressure shall not be less than 1.9 psf.

2. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 6.27 psf.
- B. Repair or replace fenestration components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.05 ADJUSTING

- A. Adjust hardware for smooth operation and secure weathertight closure.

3.06 CLEANING

- A. Remove protective material from factory finished surfaces.
- B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.
- C. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION 08 5200

SECTION 08 7100 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Hardware for wood and hollow metal doors.
- B. Thresholds.
- C. Weatherstripping and gasketing.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- C. Convey Owner's keying requirements to manufacturers.

1.03 SUBMITTALS

- A. See Division One for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
 - 1. Provide complete description for each door listed.
 - 2. Provide manufacturers and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
 - 3. Include account of abbreviations and symbols used in schedule.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- E. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- F. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.
- G. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
 - 1. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of experience.
- C. Supplier Qualifications: Company specializing in supplying commercial door hardware with at least three years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

PART 2 - PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide door hardware products that comply with the following requirements:
 - 1. Applicable provisions of federal, state, and local codes.
 - 2. Accessibility: ADA Standards and ICC A117.1.
 - 3. Applicable provisions of NFPA 101.
- C. Finishes: Provide door hardware of the same finish unless otherwise indicated.
 - 1. Finish: Satin chrome plated over nickel on brass or bronze, 626 (approx. US26D).
- D. Provide non-removable pins (NRP) when hinges are exposed to the outside of a room with locking hardware or to the exterior of exterior doors.

2.02 HINGES

- A. Manufacturers:
 - 1. Basis of Design: Hager Companies: www.hagerco.com/#sle.
 - 2. Other manufacturers:
 - a. Stanley, dormakaba Group: www.stanleyhardwarefordoors.com/#sle.
 - b. McKinney; an Assa Abloy Group company: www.assaabloydss.com/#sle
 - 3. Substitutions: See Division One.

2.03 CYLINDRICAL LOCKS, AUXILIARY LOCKS (DEADLOCKS)

- A. Manufacturers:
 - 1. Basis of Design: Falcon: www.falconlock.com.
 - 2. Other manufacturers:
 - a. Schlage, an Allegion brand: www.allegion.com/us/#sle.
 - b. Stanley, dormakaba Group: www.stanleyhardwarefordoors.com/#sle.
 - 3. Substitutions: See Division One.

2.04 LOCK CYLINDERS

- A. Manufacturers:
 - 1. Basis of Design: Falcon: www.falconlock.com.
 - 2. Other manufacturers:
 - a. Schlage, an Allegion brand: www.allegion.com/us/#sle.
 - b. Stanley, dormakaba Group: www.stanleyhardwarefordoors.com/#sle.
 - 3. Substitutions: See Division One.
- B. Provide high security mechanical type cylinders, Grade 1, with 6-pin core; coordinate with Owner for keying requirements.
 - 1. Provide cylinders from same manufacturer as locking devices.
 - 2. Provide cams and/or tailpieces as required for locking devices.

2.05 CLOSERS

- A. Manufacturers; Surface Mounted:
 - 1. Basis of Design: LCN, an Allegion brand; www.allegion.com/us.
 - 2. Other manufacturers:
 - a. Corbin Russwin, Norton, Rixson, Sargent, or Yale; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - b. Stanley, dormakaba Group: www.stanleyhardwarefordoors.com/#sle.
 - 3. Substitutions: See Division One.

2.06 WALL/FLOOR STOPS, DRIP GUARDS

- A. Manufacturers:
 - 1. Basis of Design: Hager Companies; www.hagerco.com/#sle.
 - 2. Other manufacturers:
 - a. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - b. Trimco: www.trimcohardware.com/#sle.
 - 3. Substitutions: See Division One.
 - 4. Substitute wall stop for floor stop where applicable.

2.07 THRESHOLDS, WEATHERSTRIPPING AND GASKETING

- A. Manufacturers:
 - 1. Basis of Design: National Guard Products, Inc: www.ngpinc.com/#sle.
 - 2. Other manufacturers:
 - a. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - b. Hager Companies; www.hagerco.com/#sle. National Guard Products, Inc: www.ngpinc.com/#sle.
 - 3. Substitutions: See Division One.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive this work, and that dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
 - 1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.
- D. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

3.03 ADJUSTING

- A. Adjust hardware for smooth operation.
- B. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.04 PROTECTION

- A. Protect finished Work.
- B. Do not permit adjacent work to damage hardware or finish.

3.05 SCHEDULE

A. Hardware Group 1: Exterior Entrance Doors 100A, 100E, 102D, 132A, 132B, 132C

1-1/2 pr.	BB1191 4-1/2x4-1/2	Butts	HAGER
1 ea.	4040	Closer	LCN
1 ea.	98L	Exit Device	VON DUPRIN
1 ea.	Grade 1, 6-PIN	Cylinder	FALCON
1 ea.	896BR	Threshold	NGP
1 set	129NSS	Weatherstrip	NGP

B. Hardware Group 2: Exterior Entrance Doors 109B, 130, 136

1-1/2 pr.	BB1191 4-1/2x4-1/2	Butts	HAGER
1 ea.	ANSI F109	Lockset	FALCON
1 ea.	4040	Closer	LCN
1 ea.	896BR	Threshold	NGP
1 set	129NSS	Weatherstrip	NGP

C. Hardware Group 4: Passage Doors 107, 110B, 110E, 119, 120, 121, 123, 126, 133, 134, 135

1-1/2 pr.	BB1279 4-1/2x4-1/2	Butts	HAGER
1 ea.	ANSI F75	Passage Latch	FALCON
1 ea.	406	Wall Stop	ROCKWOOD

D. Hardware Group 5: Privacy Doors 103, 104, 112

1-1/2 pr.	BB1279 4-1/2x4-1/2	Butts	HAGER
1 ea.	ANSI F76	Lockset	FALCON
1 ea.	4040	Closer	LCN

E. Hardware Group 6: Passage Doors 109A, 110A, 111, 131, 136B

1-1/2 pr.	BB1279 4-1/2x4-1/2	Butts	HAGER
1 ea.	ANSI F75	Lockset	FALCON
1 ea.	4040	Closer	LCN
1 ea.	406	Wall Stop	ROCKWOOD

F. Hardware Group 7: Office/Storage/Utility Doors 100F, 101A, 101B, 102B, 102C, 105, 106, 113, 118, 124

1-1/2 pr.	BB1279 4-1/2x4-1/2	Butts	HAGER
1 ea.	ANSI F109	Lockset	FALCON
1 ea.	4040	Closer	LCN

G. Hardware Group 8: Office/Storage/Utility Doors 102A, 108, 116, 117, 122

1-1/2 pr.	BB1279 4-1/2x4-1/2	Butts	HAGER
1 ea.	ANSI F109	Lockset	FALCON
1 ea.	4040	Closer	LCN

H. Hardware Group 9: Men's, Women's Doors 125, 127A, 127B

1-1/2 pr.	BB1279 4-1/2x4-1/2	Butts	HAGER
1 ea.	ANSI F75	Lockset	FALCON
1 ea.	4040	Closer	LCN
1 ea.	406	Wall Stop	ROCKWOOD

END OF SECTION 087100

**SECTION 08 8000
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 2500 - Weather Barriers.

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.
- C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- G. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021.
- H. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
- I. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- J. GANA (GM) - GANA Glazing Manual; 2008.
- K. GANA (SM) - GANA Sealant Manual; 2008.
- L. GANA (LGRM) - Laminated Glazing Reference Manual; 2019.
- M. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (Reaffirmed 2016).
- N. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2017.
- O. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.

- P. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2017.

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 Division 1 for submittal procedures.
- B. Product Data on Insulating Glass Unit and 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. Samples: Submit two samples 12 by 12 inch in size of glass units.
- E. 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

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

- A. See Division 1 for additional warranty requirements.
- B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Float Glass Manufacturers:

1. AGC Glass North America, Inc: www.agcglass.com/#sle.
2. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
3. Guardian Glass, LLC: www.guardianglass.com/#sle.
4. Pilkington North America Inc: www.pilkington.com/na/#sle.
5. Substitutions: See Division 1.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. 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. 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.
 3. Glass thicknesses listed are minimum.
- B. 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:
 - a. Water-Resistive Barriers: See Section 07 2500.
- C. 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: Minimum 0.31. Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Minimum 0.37. 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. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
 2. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
 3. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

2.04 INSULATING GLASS UNITS

- A. Fabricator: Certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.
- B. 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. Single-Sealed System: Provide silicone, polysulfide, or polyurethane sealant as seal applied around perimeter.
 - b. Color: Black.
 - 6. Purge interpane space with dry air, hermetically sealed.
- C. Type IG-1 - Insulating Glass Units: Vision glass, double glazed.
 - 1. Applications: Exterior glazing unless otherwise indicated.
 - 2. Space between lites filled with argon.
 - 3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - b. Coating: Low-E (passive type), on #2 surface.
 - 4. Inboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - 5. Total Thickness: 1 inch.

2.05 GLAZING UNITS

- A. Type G-2 - Monolithic Interior Vision Glazing:
 - 1. Applications: Interior glazing unless otherwise indicated.
 - 2. Glass Type: Fully tempered float glass.
 - 3. Tint: Clear.
 - 4. Thickness: 1/4 inch, nominal.

2.06 GLAZING COMPOUNDS

- A. Type GC-5 - 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 as selected.

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. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. 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.

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. Verify that sealing between joints of glass framing members has been completed effectively.
- D. 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.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

3.04 INSTALLATION - WET GLAZING METHOD (SEALANT AND SEALANT)

- A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
- B. Place setting blocks at 1/4 points and install glazing pane or unit.
- C. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line.
- D. Fill gaps between glazing and stops with Silicone type sealant to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue the air and vapor seal.
- E. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.05 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.

3.06 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 8000

SECTION 08 9100 – LOUVERS AND FOUNDATION VENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Louvers, frames, and accessories.

1.02 SUBMITTALS

- A. See Division One for submittal procedures.
- B. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.

PART 2 - PRODUCTS

2.01 LOUVERS

- A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
- B. Stationary Louvers: Horizontal blade, extruded aluminum construction.
 - 1. Blades: Straight.
 - 2. Frame: Depth as indicated on drawings, channel profile; corner joints, with continuous recessed caulking channel each side.
 - 3. Materials: Extruded Aluminum: ASTM B221 (ASTM B221M).
 - a. Aluminum Thickness: Frame 12 gauge, 0.0808 inch minimum; blades 12 gauge, 0.0808 inch minimum.
 - 4. Aluminum Finish: Primed for field finishing.
 - a. Primer: Zinc chromate, alkyd type.

2.02 ACCESSORIES

- A. Bird Screen (Gable Louvers): Interwoven wire mesh of aluminum, 14-gauge, 0.0641 inch diameter wire, 1/2 inch open weave, diagonal design.
- B. Insect Screen: 18 x 16 size aluminum mesh.
- C. Fasteners and Anchors: Stainless steel.
- D. Head and Sill Flashings: See Section 07 6200.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that prepared openings and flashings are ready to receive this work and that opening dimensions are as indicated on shop drawings.
- B. Verify that field measurements are as indicated.

3.02 INSTALLATION

- A. Install louver/vent assembly in accordance with manufacturer's instructions.
- B. Coordinate with installation of flashings by others.
- C. Install louvers level and plumb.

D. Secure louver/vent frames in openings with concealed fasteners.

3.03 CLEANING

A. Strip protective finish coverings.

B. Clean surfaces and components.

END OF SECTION 089100

**SECTION 09 2116
GYPSUM BOARD ASSEMBLIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal channel ceiling framing.
- B. Acoustic insulation.
- C. Cementitious backing board.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

- A. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.
- B. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).
- C. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017.
- D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
- E. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2020.
- F. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2019.
- G. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units; 2021.
- H. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- I. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- J. GA-216 - Application and Finishing of Gypsum Panel Products; 2018.

1.04 SUBMITTALS

- A. See Section Division 1 for submittal procedures.
- B. Product Data: Provide data on gypsum board, accessories, and joint finishing system.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 3 years of experience.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.02 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:

1. American Gypsum Company: www.americangypsum.com/#sle.
2. CertainTeed Corporation: www.certainteed.com/#sle.
3. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
4. National Gypsum Company: www.nationalgypsum.com/#sle.
5. USG Corporation: www.usg.com/#sle.
6. Substitutions: See Division 1.

- B. Gypsum Wallboard: 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, unless otherwise indicated.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.
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: 5/8 inch.

- C. Backing Board For Wet Areas:

1. Application: Surfaces behind tile in wet areas including areas where ceramic or porcelain tile is designated.
2. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.

- a. Thickness: 5/8 inch.

2.03 GYPSUM WALLBOARD ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: Match stud thickness and as indicated on drawings .
- B. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
- C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 - 1. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
 - 1. Level ceiling system to a tolerance of 1/1200.
 - 2. Laterally brace entire suspension system.
- B. Studs: Space studs at 16 inches on center.
 - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
 - 2. 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 with continuous bridging.
- C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- D. Blocking: Install wood blocking for support of:
 - 1. Framed openings.
 - 2. Wall-mounted cabinets.
 - 3. Plumbing fixtures.
 - 4. Toilet partitions.
 - 5. Toilet accessories.
 - 6. Wall-mounted door hardware.
 - 7. Wall Hung Appliances and other designated equipment to be attached to walls

3.03 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. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - 1. Place continuous bead at perimeter of each layer of gypsum board.
 - 2. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.04 BOARD 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 Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- E. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

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 levels defined in ASTM C840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 - 3. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

1. Feather coats of joint compound so that camber is maximum 1/32 inch.

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 2116

**SECTION 09 6500
RESILIENT FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Resilient base.
- C. Installation accessories.

1.02 REFERENCE STANDARDS

- A. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2020.
- B. ASTM F1859 - Standard Specification for Rubber Sheet Floor Covering Without Backing; 2021.
- C. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021.
- D. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2011.

1.03 SUBMITTALS

- A. See Division 1 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. Sustainable Design Submittal: Submit VOC content documentation for flooring and adhesives.
- E. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- F. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- G. Manufacturer's Qualification Statement.
- H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Division 1 for additional provisions.
 - 2. Extra Flooring Material: 100 square feet of each type and color.
 - 3. Extra Wall Base: 100 linear feet of each type and color.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.
- C. Testing Agency Qualifications: Independent firm specializing in performing concrete slab moisture testing and inspections of the type specified in this section.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

1.06 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. Vinyl Plank Tile: Printed film type, with transparent or translucent wear layer; acoustic interlayer or backing.
 - 1. Manufacturers:
 - a. EF Contract; Melange 5mm; <https://www.efcontractflooring.com/>.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Minimum Requirements: Comply with ASTM F1700, Class III.
 - 3. Wear Layer Thickness: 0.020 inch.
 - 4. Total Thickness: 0.20 inch.
 - 5. Color: As indicated on drawings.

2.02 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; style as scheduled.
 - 1. Manufacturers:
 - a. Burke Flooring: www.burkeflooring.com/#sle.

- b. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
 - c. Roppe Corporation: www.roppe.com/#sle.
 - d. Substitutions: See Division 1.
- 2. Height: 4 inch.
 - 3. Thickness: 0.125 inch.
 - 4. Finish: Satin.

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. 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. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Remove existing resilient flooring and flooring adhesives; follow the recommendations of RFCI (RWP).
- B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- C. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- D. Prohibit traffic until filler is fully cured.
- E. Clean substrate.

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. Fit joints and butt seams tightly.
 - 3. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 - 1. Resilient Strips: Attach to substrate using adhesive.
- E. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - SHEET FLOORING

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.
- B. Seams are prohibited in Stair Landings.

3.05 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 plank tile with a random offset of at least 6 inches from adjacent rows.

3.06 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.

3.07 INSTALLATION - STAIR COVERINGS

- A. Adhere over entire surface. Fit accurately and securely.

3.08 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.09 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION 09 6500

**SECTION 09 6813
TILE CARPETING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile and walk off tile, adhesive tile adhered.
- B. Coordination with preparation and testing specified in Section 09 05 61, Common Work Results for Flooring Preparation.

1.02 SUBMITTALS

- A. See Section Division One, for submittal procedures.
- B. Shop Drawings: Indicate layout of joints and location of edge moldings.
- C. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet with minimum three years experience.

1.04 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. Manufacturer, products, color, pattern, and locations are in Finish Legend on drawings.
- B. Other Acceptable Manufacturers:
 - 1. Tandus: www.tandus.com.

2. Interface, Inc: www.interfaceinc.com.
3. Lees Carpets: www.leescarpets.com.
4. Milliken & Company: www.milliken.com.
5. Substitutions: See Division 1.

2.02 ACCESSORIES

- A. Floor Filler: Type recommended by flooring material manufacturer.
- B. Edge Strips, Transition Strips and Trims: Manufacturer, product, color, pattern, and locations are in finish schedule on drawings.
- C. Adhesive Tiles: Pressure sensitive adhesive applied on one side of polyester film, approximately 3 inches square, intended to connect carpet tiles together. Use only products approved by carpet tile manufacturer, and compatible with substrates to which carpet tile is being installed.
- D. Broadloom Adhesive: Manufacturer approved adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.
 1. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet tile 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. Lay carpet tile in square pattern, with pile direction alternating to next unit (quarter turn), set parallel to building lines.
- F. Locate change of color or pattern flooring between rooms under door centerline.

- G. Install in accordance with adhesive tile and carpet tile manufactures printed installation instructions.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

3.03 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION 09 6813

**SECTION 099000
PAINTING AND COATING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints including designated floors.
- C. Specified testing of substrates.
- D. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Pipe and Tube Railings and Guard rails.
 - 3. Exposed surfaces of steel lintels and ledge angles.
 - 4. Mechanical and Electrical:
 - a. In finished areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
 - 5. All items noted on drawings to be painted.
- E. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Non-metallic roofing and flashing.
 - 6. Stainless steel, anodized aluminum, bronze, terne, and lead items.
 - 7. Glass.
 - 8. Acoustical materials, unless specifically so indicated.
 - 9. Concealed pipes, ducts, and conduits.

1.02 DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this section.

1.03 SUBMITTALS

- A. See Division 1, for submittal procedures.
- B. Product Data: Provide complete list of all products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 3. Manufacturer's installation instructions.
 - 4. If proposal of substitutions is allowed under submittal procedures, explanation of all substitutions proposed.
- C. Samples: Submit two painted samples, illustrating selected colors for each color and system selected with specified coats cascaded. Submit on tempered hardboard, 12x12 inch in size.
- D. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.
- E. Certification: By manufacturer that all paints and coatings do not contain any of the prohibited chemicals specified; GreenSeal GS-11 certification is not required but if provided shall constitute acceptable certification.
- F. Certification: Prior to installation of floor coating, submit written certification by floor coating manufacturer and installer that condition of sub-floor is acceptable.
- G. Results of all required testing.
- H. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.
- I. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.
- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Paint and Coatings: 1 gallon of each color; store where directed.
 - 2. Label each container with color in addition to the manufacturer's label.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum ten years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years documented experience.

1.05 MOCK-UP

- A. Provide panels, 2 feet long by 2 feet wide, illustrating each paint and coating color, texture, and finish. Apply the same number of coats as specified.
- B. Locate where directed.
- C. Mock-up may remain as part of the work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
 - 1. Basis of Design: Sherwin-Williams Company: www.sherwin-williams.com.
 - 2. Benjamin Moore & Co: www.benjaminmoore.com.
 - 3. PPG Architectural Finishes, Inc: www.ppgaf.com.
 - 4. Substitutions: See Division 1.
- C. Primer Sealers: Same manufacturer as top coats.

- D. Block Fillers: Same manufacturer as top coats.
- E. Substitutions: See Division One.

2.02 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
 - 1. Provide paints and coatings 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.
 - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 4. Supply each coating material in quantity required to complete entire project's work from a single production run.
 - 5. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
 - 1. Provide coatings 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.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Chemical Content: The following compounds are prohibited:
 - 1. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 - 2. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.
- E. Flammability: Comply with applicable code for surface burning characteristics.
- F. Colors: As indicated on drawings in finish schedule.

1. Extend colors to surface edges; colors may change at any edge as directed by Architect.
2. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Exterior Ferrous Metal Galvanized and Non- Galvanized; Lintels, and other ferrous metal items shown on drawings to be painted.
 1. Two top coats and one coat primer.
 2. Semi- gloss.
 3. Top Coat Product:
 - a. Sherwin Williams DTM Acrylic Coating Product NO B-66-W2-11.
 4. Primer: Sherwin Williams DTM Acrylic Primer Product No. B-66-W1.

2.04 PAINT SYSTEMS - INTERIOR

- A. All Interior Surfaces Indicated to be Painted, Unless Otherwise Indicated: Including gypsum board, shop primed steel, and galvanized steel.
 1. Two top coats and one coat primer.
 2. Eggshell: MPI gloss level 3; use this sheen at all locations.
 3. Top Coat Product(s):
 - a. Latex, interior, eggshell: S-W ProMar 200 Zero VOC Latex Eggshell, at 4.0 mils wet, 1.6 mils dry, per coat.
 4. Primer(s): As recommended by manufacturer of top coats.
- B. Interior Ferrous Metal Galvanized and Non- Galvanized; Guardrails, handrails, hollow metal doors and frames and other ferrous metal items shown on drawings to be painted.
 1. Two top coats and one coat primer.
 2. Semi- Gloss.
 3. Top Coat Product(s):
 - a. Latex, interior, semi-gloss: S-W ProMar 200 Zero VOC Latex Semi-Gloss, at 4.0 mils wet, 1.6 mils dry, per coat.
 4. Primer(s): SW Pro- Cryl Universal Primer, B66-310.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of coatings until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Moisture Testing: Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating 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 or repair existing coatings that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

- H. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- I. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-PC 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).
- J. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- K. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

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 instructions.
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance.
- F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- G. Sand metal surfaces lightly between coats to achieve required finish.
- H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finished coatings until completion of project.
- B. Touch-up damaged coatings after Substantial Completion.

END OF SECTION 09 9000

**SECTION 10 1400
SIGNAGE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Room and door signs.
- B. Interior directional and informational signs.
- C. Exterior Building identification signs.

1.02 SUBMITTALS

- A. See Division 1 for submittal procedures.
- B. 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.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. When room numbers to appear on signs differ from those on the drawings, include the drawing room number on schedule.
 - 2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
 - 3. Submit for approval by Owner through Architect prior to fabrication.
- D. 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.
- E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- F. Verification Samples: Submit samples showing colors specified.
- G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Store tape adhesive at normal room temperature.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Interior Flat Signs:
 - 1. Best Sign Systems, Inc: Graphic Blast MP; www.bestsigns.com.
 - 2. Cosco Industries (ADA signs); ADA Series 1: www.coscoarchitecturalsigns.com/#sle.
 - 3. FASTSIGNS; www.fastsigns.com/#sle.
 - 4. Substitutions: See Division 1.
- B. Exterior Dimensional Letter Signs: Flat Cut Metal Letters (Exterior Building Signage).
 - 1. Cosco Industries: www.coscoarchitecturalsigns.com/#sle.
 - 2. FASTSIGNS: www.fastsigns.com/#sle.
 - 3. Gemini Incorporated.www.signletters.com
 - 4. Substitutions: See Division 1.
- C. Accessible Parking Signs: Provided and installed by Contractor-See Civil drawings for sign type and location.

2.02 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: All signs are required to comply with ADA Standards for Accessible Design and ANSI/ICC A 117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Toilet Room Door Signs: Provide a sign for every doorway indicated.
 - 1. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
 - 2. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", and braille. See drawings for size and other requirements.
- C. Exterior Dimensional Letter Signs:
 - 1. Use individual Aluminum letters, flat cut. Font and color as selected by Architect.
 - 2. Mount on building in location shown on drawings. Size as indicated on drawings.

2.03 SIGN TYPES

- A. Flat Signs: Signage media without frame.
 - 1. Edges: Square.
 - 2. Corners: Square.
 - 3. Wall Mounting of One-Sided Signs: Double Stick tape.

- B. Color and Font: Unless otherwise indicated:
 - 1. Character Font: Helvetica, Arial, or other sans serif font.
 - 2. Character Case: Upper case only.
 - 3. Background Color: As Selected.
 - 4. Character Color: Contrasting color.

2.04 DIMENSIONAL LETTERS

- A. Metal Letters:
 - 1. Metal: Aluminum sheet, flat.
 - 2. Metal Thickness: 1/8 inch minimum.
 - 3. Letter Height: 24" height as shown on drawings.
 - 4. Text and Typeface:
 - a. Character Font: Helvetica, Arial, or other sans serif font to match drawings.
 - b. Character Case: Upper case only.
 - 5. Finish: Powder Coat Paint Finish.
 - 6. Mounting: Concealed screws.

2.05 ACCESSORIES

- A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.
- B. Exposed Screws: Chrome plated.
- C. Tape Adhesive: Double sided tape, permanent adhesive.

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 and in locations as depicted on the drawings.
- B. Install neatly, with horizontal edges level.
- C. Locate signs where indicated by Architect:
 - 1. If no location is indicated obtain Architect's instructions.

D. Protect from damage until Substantial Completion; repair or replace damage items.

END OF SECTION 10 1400

SECTION 10 2113.19 - PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Solid plastic toilet compartments.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.03 SUBMITTALS

- A. See Division One 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. Manufacturer's Installation Instructions: Indicate special procedures.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Solid Plastic Toilet Compartments:
 - 1. Scranton Products; Hiny Hiders Partitions: www.scrantonproducts.com.
 - 2. Bradley Corporation; HDPE Partitions: www.bradleycorp.com.
 - 3. General Partitions; HDPE Partitions: www.generalpartitions.com.
 - 4. Substitutions: See Division One.

2.02 PLASTIC TOILET COMPARTMENTS

- A. Solid Plastic Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high-density polyethylene (HDPE), tested in accordance with NFPA 286; floor-mounted unbraced.
 - 1. Color: Selected from manufacturer's full range of standard colors..
 - 2. Doors:
 - a. Thickness: 1 inch.
 - b. Width: 24 inch.
 - c. Width for Handicapped Use: 36 inch.
 - d. Height: 58 inch.
 - 3. Panels:
 - a. Thickness: 1 inch.
 - b. Height: 58 inch.
 - 4. Pilasters:
 - a. Thickness: 1 inch.
 - b. Width: As required to fit space; minimum 3 inch.

2.03 ACCESSORIES

- A. Pilaster Shoes: Plastic, to match compartments, 3 inches high; concealing floor fastenings.

- B. Wall and Pilaster Brackets: Stainless steel; manufacturer's standard type for conditions indicated on drawings.
- C. Attachments, Screws, and Bolts: Stainless-steel, tamper-proof type.
- D. Hinges: Stainless steel, manufacturer's standard finish.
 - 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
- E. Door Hardware: Stainless steel, manufacturer's standard finish.
 - 1. Door Latch: Slide type with exterior emergency access feature.
 - 2. Door Strike and Keeper with Rubber Bumper: Mount on pilaster in alignment with door latch.
 - 3. Provide door pull for outswinging doors.
- F. Coat Hook with Rubber Bumper: One per compartment, mounted on door.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated on shop drawings.
- B. 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.

3.03 TOLERANCES

- A. Maximum Variation from True Position: 1/4 inch.
- B. Maximum Variation from Plumb: 1/8 inch.

3.04 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 outswinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION 102113.19

**SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Accessories for toilet rooms.
- B. Grab bars.

1.02 SUBMITTALS

- A. See Division One, for submittal procedures.
- B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Toilet Accessories: See Schedule on Drawings for specific accessories, manufacturers, and locations.
- B. Other acceptable Manufacturers:
 - 1. A & J Washroom Accessories Inc: www.ajwashroom.com.
 - 2. Bradley Corporation: www.bradleycorp.com.
 - 3. Bobrick: www.bobrick.com.
 - 4. Substitutions: See Division One.
- C. All items of each type to be made by the same manufacturer.

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 product data.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights and Locations: As required by accessibility regulations and as indicated on drawings

3.04 SCHEDULE

- A. See Drawings for Schedule.

END OF SECTION 10 2800

**SECTION 10 4400
FIRE PROTECTION SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers-Provided by Owner.
- B. Fire extinguisher cabinets.

1.02 SUBMITTALS

- A. See Division One, for submittal procedures.
- B. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, and all installation details.
- C. Product Data: Provide extinguisher operational features, color and finish, and anchorage details.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.03 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. Provided by Owner
- B. Fire Extinguisher Cabinets:
 - 1. Basis of Design JL Industries, Inc; Product Ambassador Series No. 1816-F-18 Semi-Recessed Type with Laminated Safety Glass: www.jlindustries.com.
 - 2. Other acceptable Manufacturers:
 - a. Larsen's Manufacturing Co: www.larsensmfg.com.
 - b. Potter-Roemer: www.potterroemer.com.
 - c. Pyro-Chem: www.pyrochem.com.
 - 3. Substitutions: See Division One.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.
- C. Place extinguishers in cabinets.

END OF SECTION 10 4400

**SECTION 10 5126
PLASTIC LOCKERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid plastic lockers.
- B. Locker benches.

1.02 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021a.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- D. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2019.

1.03 SUBMITTALS

- A. See Division 1 for submittal procedures.
- B. Product Data: Manufacturer's published data on locker construction, sizes and accessories.
- C. Shop Drawings: Indicate locker plan layout, numbering plan and combination lock code.
- D. Samples: Submit full range of available color samples for color selection.
- E. Manufacturer's Installation Instructions: Indicate component installation assembly.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Solid Plastic Lockers:
 - 1. ASI Storage Solutions: www.asi-storage.com/#sle.
 - 2. Columbia Lockers, a division of PSiSC: www.psis.com/#sle.
 - 3. List Industries, Inc: www.listindustries.com/#sle.
 - 4. Basis of design: Scranton Products; Tufftec Lockers: www.scrantonproducts.com/#sle.
 - 5. Substitutions: See Division 1.

2.02 LOCKER APPLICATIONS

- A. Changing Lockers: Solid plastic lockers, wall mounted with matching closed base.
 - 1. Width: 12 inches for 2-Tier.

2. Depth: 15 inches for 2-Tier.
 3. Height: 72 inches.
 4. Locker Configuration: Single tier. See Drawings for arrangements.
 5. Fittings: Size and configuration as indicated on drawings.
 - a. Hat shelf.
 - b. Coat rod.
 - c. Hooks: Two single prong.
 6. Locking: Padlock hasps, for padlocks provided by Owner.
- B. Locker Benches: Stationary type; bench top of solid high density polyethylene (HDPE); aluminum pedestals.
1. Height: 18 inch.
 2. Length: 42 inch.
 3. Depth: 20 inch.
- C. Locker Bench Support: Welded structural aluminum floor mount pedestal bench support; pre-drilled for bench top material attachment.
1. Accessibility: Comply with ICC A117.1 and ADA Standards.
 2. Finish: Clear anodized.

2.03 SOLID PLASTIC LOCKERS

- A. Accessibility: Comply with ICC A117.1 and ADA Standards.
- B. Lockers: Factory assembled, made of solid plastic panels, tested in accordance with NFPA 286, homogenous color throughout.
1. Material: Antimicrobial solid high density polyethylene (HDPE).
 - a. Manufactured with EPA registered antimicrobial additive incorporated into HDPE material; suppresses growth of bacteria, algae, fungus, mold, and mildew.
 2. Doors: Full overlay without frame.
 3. Locker Body Construction: Manufacturer's standard for selected product.
 4. Where locker ends or sides are exposed, provide same finish as fronts or provide extra panels to match fronts.
 5. Door Color: To be selected by Architect.
 6. Body Color: To be selected by Architect.

- C. Component Thicknesses:
 - 1. Doors: 1/2 inch minimum thickness.
 - 2. Locker Body: Tops, bottoms, backs, and shelves 3/8 inch minimum.
 - 3. End Panels and Filler Panels: 1/2 inch minimum thickness.
 - 4. Toe Kick Plates: 1/2 inch minimum thickness.
- D. Hinges: Full height of locker, manufacturer's standard heavy duty type.
- E. Coat Hooks: stainless steel.
- F. Number Plates: Provide rectangular shaped aluminum plates.
- G. Built-In Lock Boxes: Same material as locker, manufacturer's standard size, with padlock hasps, for padlocks provided by Owner.
- H. Locker Base: Solid plastic base, 4 inches high, field assembled.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared bases are in correct position and configuration.
- B. Verify bases and embedded anchors are properly sized.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Place and secure on prepared base.
- C. Install lockers plumb and square.
- D. Secure lockers to wall with anchor devices to suit substrate materials. Minimum Pullout Force: 100 pounds.
- E. Install end panels, filler panels, and sloped tops.
- F. Install fittings if not factory installed.
- G. Replace components that do not operate smoothly.

3.03 CLEANING

- A. Clean locker interiors and exterior surfaces.

END OF SECTION 10 5126

**SECTION 12 2400
WINDOW SHADES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Window shades and accessories.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week prior to commencing work related to products of this section; require attendance of all affected installers.
- B. Sequencing:
 - 1. Do not fabricate shades until field dimensions for each opening have been taken.
 - 2. Do not install shades until final surface finishes and painting are complete.

1.03 SUBMITTALS

- A. See Division One, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
- C. Shop Drawings: Include shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.
- D. LEED Submittals:
 - 1. LEED Prohibited Content Installer Certification, Section 01 36 30.
 - 2. LEED Accessory Material VOC Content Certification Form, Section 01 61 16.01.
 - 3. Product Data: Provide data supporting claims made in LEED forms above.
- E. Verification Samples: Minimum size 6 inches square, representing actual materials, color and pattern.
- 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 systems and show interconnecting wiring.
- H. Operation and Maintenance Data: List of all components with part numbers, sources of supply, 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.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of experience.
- B. Installer Qualifications: Company specializing in performing work of this type with minimum five years of documented experience.
 - 1. Factory training and demonstrated experience.

1.05 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.

1.06 FIELD CONDITIONS

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.07 WARRANTY

- A. Provide manufacturer's warranty from the Date of Substantial Completion, covering the following:
 - 1. Shade Hardware: 2 years.
 - 2. Fabric: 2 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manually Operated Roller Shades:
 - 1. Basis of Design: Draper, Inc; Clutch Operated FlexShade including Single and Dual Roller: www.draperinc.com.
 - 2. Hunter Douglas: www.hunterdouglas.com.
 - 3. Graber, division of Springs Window Fashions: www.graberblinds.com.
 - 4. Substitutions: See Division One.
- B. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

2.02 WINDOW SHADE APPLICATIONS

- A. Shades: Blackout shades with second shade in same opening.
 - 1. Type: Roller shades.
 - 2. Fabric: Sheer:Phifer SW2400. Blackout: SunBloc SB9000.
 - 3. Colors: shown in Window Schedule on drawings.

4. Mounting: Inside (between jambs) and above ceiling as shown on drawings.
5. Operation: Manual.

2.03 ROLLER SHADES

- A. Roller Shades: Fabric roller shades complete with mounting brackets, roller tubes, hembars, hardware and accessories; fully factory-assembled.
 1. Drop: Regular roll.
 2. Size: As indicated on drawings.
- B. Fabric: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
 1. Blackout Shades: Block virtually all the light; Openness Factor equal to zero (0).
 2. Flammability: Pass NFPA 701 large and small tests.
- C. Roller Tube: As required for type of operation, extruded aluminum with end caps.
 1. Dimensions: Manufacturer's standard, selected for suitability for installation conditions, span, and weight of shades.
 2. Fabric Attachment: Utilize double sided adhesive tape.
 3. Finish: Clear anodized.
- D. Hembars and Hembar Pockets: Wall thickness designed for weight requirements and adaptation to uneven surfaces, to maintain bottom of shade straight and flat.
 1. Style: Full wrap fabric covered bottom bar, flat profile with closed ends.
- E. Manual Operation: Clutch operated continuous loop; beaded ball chain meeting WCMA A100.1.

2.04 ACCESSORIES

- A. Fascias: Size as required to conceal shade mounting.
 1. Style: As selected by Architect from shade manufacturer's full selection.
- B. Brackets and Mounting Hardware: As recommended by manufacturer for mounting configuration and span indicated.
- C. Fasteners: Non-corrosive, and as recommended by shade manufacturer.

2.05 FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. 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: Fill openings from jamb to jamb.
- C. Dimensional Tolerances: As recommended in writing by manufacturer.
- D. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine finished openings for deficiencies that may preclude satisfactory installation.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. 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. Installation Tolerances:
1. Inside Mounting: Maximum space between shade and jamb when closed of 1/16 inch.
 2. Maximum Offset From Level: 1/16 inch.
- C. Replace blinds that exceed specified dimensional tolerances at no extra cost to Owner.
- D. Adjust level, projection and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure shades for smooth operation.

3.04 CLEANING

- A. Clean soiled shades and exposed components as recommended by manufacturer.
- B. Replace shades that cannot be cleaned to "like new" condition.

3.05 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate operation and maintenance of window shade system to Owner's personnel.

- B. Training: Train Owner's personnel on operation and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours training by manufacturer's authorized personnel at location designated by the Owner.

3.06 PROTECTION

- A. Protect installed products from subsequent construction operations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 12 2400

**SECTION 13 2126
COLD STORAGE ROOMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Prefabricated insulated cold storage rooms with wall and ceiling panels.
- B. Door, frame, and hardware.
- C. Refrigeration coils to function with remote unit.
- D. Controls and lighting.
- E. Shelving and supports.
- F. Maintenance of refrigeration unit.

1.02 REFERENCE STANDARDS

- A. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2021a.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- C. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- D. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- E. NSF 7 - Commercial Refrigerators and Freezers; 2024.
- F. NEMA MG 00001 - Motors and Generators; 2024.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL (DIR) - Online Certifications Directory; Current Edition.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination with Concrete Work: Coordinate size and location of recess in concrete floor/slab.
- B. Coordination with Electrical: Coordinate location and characteristics of electrical service.
- C. Preinstallation Meeting: Convene one week before starting work of this section.

1.04 SUBMITTALS

- A. See Division 1 for submittal procedures.
- B. Product Data: Provide data on hardware and fixtures, joint details.

- C. Shop Drawings: Indicate layout, room dimensions, materials, components, fasteners, doors, hardware, equipment, finishes, method of installation and assembly, panel placement, supplementary structural support or bracing, controls, and service rough-in.
- D. Certificates: Certify that products of this section meet or exceed specified requirements.
- E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention .
- F. Designer's Qualification Statement.
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.
- I. Operation Data: Include operating equipment, service and lubrication schedules , and operating instructions.
- J. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 WARRANTY

- A. See Division 1 for additional warranty requirements.
- B. Correct defective Work within a five-year period after Date of Substantial Completion.
- C. Provide five-year manufacturer warranty for remote refrigeration compressor unit.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cold Storage Rooms:
 - 1. Coldmatic Building Systems: www.coldmatic.com/#sle.
 - 2. Darwin Chambers Company: www.darwinchambers.com/#sle.
 - 3. Zer-O-Loc Enterprises Ltd: www.zeroloc.com/#sle.
 - 4. Substitutions: See Division 1.

2.02 COLD STORAGE ROOMS

- A. Cold Storage Rooms: Factory-fabricated packaged units, comprised of modular panels, equipment, and fittings.
 - 1. Exposed components are noncombustible.
 - 2. Food Service Applications: Comply with NSF 7.
 - 3. Electrical Equipment: Listed and classified by UL (DIR) as suitable for purpose specified and as indicated on drawings.

2.03 PERFORMANCE REQUIREMENTS

- A. Wall Panels: Withstand live lateral load of 100 lbs point load, and 5 psf uniform load.
- B. Ceiling Panels: Withstand their own weight, dead loads, and live loads of 20 psf with maximum deflection of 1:180.
- C. Cooler Rooms: Maintain 40 degrees F; plus or minus.
- D. Freezer Rooms: Maintain 20 degrees F; plus or minus.
- E. Air Leakage: Limit air leakage through assembly to 0.06 cu ft/min sq ft of wall area, with pressure difference across assembly of 1.57 psf in accordance with ASTM E283/E283M.
- F. Vapor Seal: Interior room of one atmospheric pressure, 14.7 psi, at 72 degrees F, 40 percent relative humidity (RH); without seal failure.
- G. Vapor Tightness: Sufficient to eliminate frost accumulation.

2.04 COMPONENTS

- A. Wall Panels:
 - 1. Exterior Sheet: 0.030 inch minimum thickness, aluminum.
 - 2. Interior Sheet: 0.030 inch minimum thickness, aluminum.
 - 3. Core: Insulation bonded to exterior and interior sheets.
 - 4. Panel Width: Up to 48 inch, one piece floor to ceiling.
 - 5. Panel Assembly: Tongue and groove edges, integral cam action locking clamps spaced maximum of 40 inch on center.
- B. Ceiling Panels: Same construction as walls except exterior sheets of 0.023 inch minimum thickness, aluminum.
- C. Insulation Thickness: 3 inch minimum.
- D. Doors: Overlap type for 34 by 78 inch minimum opening, similar construction of walls with edges closed; 2-1/2 inch thick insulation.
- E. Hardware: Cast brass, nylon bearing self closing hinges, roller catch latch and keeper; cylinder lock and inside safety release mechanism.
- F. Door Gaskets: Resilient hollow neoprene; electric heated at freezer doors; organic grease and oil resistant, replaceable and adjustable, concealed magnetic strip to maintain air tight seal.
- G. Shelving and Supports: Stainless steel construction, open rod construction, free standing style .
- H. View Windows: Sealed insulating glass units in doors and walls, triple insulating glass at freezers.
- I. Shelving and Supports: Stainless steel construction, open rod construction, free standing style.

- J. Light Fixtures: Vapor tight, incandescent with 150 watt lamp, operating toggle switch on exterior wall of room with pilot light, wired in rigid conduit.

2.05 MATERIALS

- A. Steel Sheet: Aluminum-zinc alloy-coated steel sheet, ASTM A792/A792M, with AZ55/AZM165 coating; 0.030 inch minimum thickness.
- B. Insulation: Polyurethane foamed-in-place, density 2.2 lb/cu ft, K factor of 0.12, self extinguishing type.
- C. Accessories: Thresholds, closure plates, ramps, hanger rods, tie down plates, bolts, screws, and washers; noncorrosive.
- D. Insulating Glass Units (IGU): Hermetically sealed double pane units, 1/4 inch thick lights, clear float glass panes, 5/8 inch unit thickness; certified by independent testing agency to comply with ASTM E2190.
- E. Sealant: ASTM C920, elastomeric sealant capable of performing under long-term cold temperature exposure. See Section 07 9200 for additional requirements.
- F. Ensure materials used are in accordance with requirements of Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

2.06 EQUIPMENT

- A. Cooling System: Direct expansion refrigerant, air cooled; remote located condensing unit for all rooms, self contained with valves, controls, switches, timers, refrigerant piping, insulated suction lines, and wiring. Size and capacity to maintain environment specified; electric defrost ; electrically heated trace condensate drain.
 - 1. Cooling Unit: Locate remote from cold storage rooms Outside the building . Pipe coolant to cold rooms.
- B. Motor: NEMA MG 1.
- C. Control Panel: Provide with alarms, and controls at door of each room.
- D. Thermometer: Direct reading type.
- E. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to NFPA 70.
- F. Disconnect Switch: Factory mount disconnect switch in control panel.

2.07 FINISHES

- A. Exterior Aluminum Cladding: White color, baked acrylic enamel.
- B. Interior Aluminum Cladding: White color, baked acrylic enamel.
- C. Hardware: Polished chrome.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces, prepared openings, and roughed-in utilities are ready to receive work and opening dimensions are as indicated on drawings.

3.02 INSTALLATION

- A. Assemble and install components in accordance with manufacturer's instructions.
- B. Set floor panels in place and align. Connect to floor drains. Seal joints continuously and lock panels tightly together.
- C. Set wall attachments on floor and anchor securely. Align over insulated break of recessed insulated floor slab.
- D. Cut holes, install anchors, and seal room panels for plumbing, power, and lighting.
- E. Assemble wall panels; lock in place with cam locks, and brace securely until ceiling panels are installed.
- F. Install ceiling panels; lock into wall panels. Provide and install supplementary ceiling hanger supports to building structure above.
- G. Install sill plate at door opening and heated thresholds and ramps.
- H. Hang doors, and adjust to operate smoothly.
- I. Locate condensing unit for each room on top of roof above door, support coil on room interior and make connections as required. Wire-in alarm unit and door and threshold heaters. Connect units to valved water piping and run condensate line to nearest drain.
- J. Install ceiling trim, ceiling fascia, cover plates between top of room and finished ceiling and end closure plates between room and adjacent wall.
- K. Seal joints and services through walls with sealant to provide moisture and vapor seal.

3.03 FIELD QUALITY CONTROL

- A. Test and adjust control equipment to ensure performance complies with specified requirements.
- B. Operate each room and test full range of functions over a continuous 48 hour period, recording physical data on operating equipment. Continuously record temperature and humidity.
- C. Test each room for air tightness.
- D. Adjust and retest rooms not meeting requirements.
- E. Provide three copies of a written quality control test report.
- F. Shut off equipment and controls and lock doors to prevent operation or access by unauthorized persons.

3.04 CLEANING

- A. Remove temporary protection from prefinished surfaces.
- B. Wash and clean floor, walls, and ceiling inside room and exposed surfaces on the outside.
- C. Clean glass, fixtures, and fittings.

3.05 CLOSEOUT ACTIVITIES

- A. Demonstrate, in the presence of Owner, the operation, function, and maintenance of each room and its associated equipment.

3.06 MAINTENANCE

- A. See Division 1 for additional requirements relating to maintenance service.
- B. Provide service and maintenance of refrigeration unit for two years from Date of Substantial Completion, at no extra cost to Owner.

END OF SECTION 13 2126

**SECTION 21 0500
COMMON WORK RESULTS FOR FIRE SUPPRESSION**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe, fittings, sleeves, escutcheons, seals, and connections for sprinkler systems.

1.2 REFERENCE STANDARDS

- A. ASME A112.18.1 - Plumbing Supply Fittings; 2018.
- B. NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems; 2016.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

PART 2 PRODUCTS

2.1 FIRE PROTECTION SYSTEMS

- A. Sprinkler Systems: Comply with NFPA 13.

2.2 ABOVE GROUND PIPING

- A. Steel Pipe: , black.

2.3 PIPE SLEEVES

- A. Vertical Piping:
 - 1. Sleeve Length: 1 inch above finished floor.
 - 2. Provide sealant for watertight joint.
 - 3. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.

2.4 ESCUTCHEONS

- A. Material:
 - 1. Chrome-plated.
 - 2. Metals and Finish: Comply with ASME A112.18.1.
- B. Construction:

1. One-piece for mounting on chrome-plated tubing or pipe and one-piece or split-pattern type elsewhere.
2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.

2.5 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
- C. Vertical Support: Steel riser clamp.
- D. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
- B. Install standpipe piping, hangers, and supports in accordance with NFPA 14.
- C. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- D. Install piping to conserve building space, to not interfere with use of space and other work.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Pipe Hangers and Supports:
 1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 2. Place hangers within 12 inches of each horizontal elbow.
 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- I. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Structural Considerations:
 1. Do not penetrate building structural members unless indicated.

- K. Provide sleeves when penetrating floors, walls, and partitions. Seal pipe, including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
- L. Escutcheons:
 - 1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
 - 2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
 - 3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.
- M. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.2 CLEANING

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION 21 05 00

SECTION 21 05 53 - IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe markers.

1.2 SUBMITTALS

- A. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- B. Manufacturer's Installation Instructions: Indicate special procedures, and installation instructions.

PART 2 PRODUCTS

2.1 PIPE MARKERS

- A. Color: Comply with ASME A13.1.
- B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- C. Color code as follows:
 - 1. Sprinkler piping: Red with white letters.

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Install plastic pipe markers in accordance with manufacturer's instructions.

END OF SECTION 21 05 53

SECTION 21 13 00 - FIRE-SUPPRESSION SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wet-pipe sprinkler system.
- B. Dry-pipe sprinkler system.
- C. System design, installation, and certification.

1.2 RELATED REQUIREMENTS

- A. Section 21 05 00 - Common Work Results for Fire Suppression: Pipe and fittings.
- B. Section 21 05 53 - Identification for Fire Suppression Piping and Equipment.
- C. Section 28 46 00 - Fire Detection and Alarm.

1.3 REFERENCE STANDARDS

- A. NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.5 SUBMITTALS

- A. Shop Drawings:
 - 1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
 - 2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
 - 3. Submit professionally engineered sealed shop drawings, product data, and hydraulic calculations to Authorities Having Jurisdiction for approval. Submit proof of approval to Architect.
- B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Sprinklers: Type and size matching those installed, in quantity required by referenced NFPA design and installation standard.
 - 3. Sprinkler Wrenches: For each sprinkler type.

PART 2 PRODUCTS

2.1 SPRINKLER SYSTEM

- A. Sprinkler System: Provide coverage for entire building.
- B. Occupancy: Light hazard; comply with NFPA 13.
- C. Water Supply: Determine volume and pressure from water flow test data.
- D. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.

2.2 SPRINKLERS

- A. Suspended Ceiling Type: Recessed pendant type with matching push on escutcheon plate.
 - 1. Response Type: Quick.
 - 2. Finish: Brass.
 - 3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- B. Exposed Area Type: Pendant type with guard.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Standard.
 - 3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- C. Sidewall Type: Recessed horizontal sidewall type with matching push on escutcheon plate.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Standard.
 - 3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- D. Dry Sprinklers: Concealed pendant type with matching push on escutcheon plate.
 - 1. Response Type: Quick.
 - 2. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- E. Storage Sprinklers: Pendant type with guard.
 - 1. Response Type: Standard.
 - 2. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- F. Guards: Finish to match sprinkler finish.
- G. Flexible Drop System: Stainless steel, multiple use, open gate type.
 - 1. Application: Use to properly locate sprinkler heads.
 - 2. Include all supports and bracing.
 - 3. Provide braided type tube as required for the application.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with referenced NFPA design and installation standard.
- B. Install equipment in accordance with manufacturer's instructions.

- C. Place pipe runs to minimize obstruction to other work.
- D. Place piping in concealed spaces above finished ceilings.
- E. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.
- F. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
- G. Flush entire piping system of foreign matter.
- H. Install guards on sprinklers where indicated.
- I. Hydrostatically test entire system.
- J. Require test be witnessed by Fire Marshal.

END OF SECTION 21 13 00

**SECTION 22 05 17
SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe sleeves.

1.2 RELATED REQUIREMENTS

- A. Section 22 05 23 - General-Duty Valves for Plumbing Piping.
- B. Section 22 05 53 - Identification for Plumbing Piping and Equipment: Piping identification.
- C. Section 22 07 19 - Plumbing Piping Insulation.

1.3 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2024.

1.4 SUBMITTALS

- A. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.5 WARRANTY

- A. Correct defective Work within a 1 year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 PIPE SLEEVES

- A. Vertical Piping:
 - 1. Sleeve Length: 1 inch above finished floor.
 - 2. Provide sealant for watertight joint.
 - 3. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.
- B. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
- C. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
 - 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 - 2. Connect sleeve with floor plate except in mechanical rooms.
- D. Clearances:
 - 1. Provide allowance for insulated piping.

2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
3. All Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 07 84 00 to prevent the spread of fire, smoke, and gases.

PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.

3.2 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
 1. Aboveground Piping:
 - a. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
 2. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.
- E. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.3 CLEANING

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION 22 05 17

**SECTION 22 05 23
GENERAL-DUTY VALVES FOR PLUMBING PIPING**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Applications.
- B. General requirements.
- C. Ball valves.

1.2 RELATED REQUIREMENTS

- A. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
- B. Section 22 07 19 - Plumbing Piping Insulation.

1.3 ABBREVIATIONS AND ACRONYMS

- A. CWP: Cold working pressure.

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Use the following precautions during storage:
 - 1. Maintain valve end protection and protect flanges and specialties from dirt.
 - a. Provide temporary inlet and outlet caps.

PART 2 PRODUCTS

2.1 APPLICATIONS

- A. Provide the following valves for the applications if not indicated on drawings:
 - 1. Shutoff: Ball
- B. Domestic, Hot and Cold Water Valves:
 - 1. 2 NPS and Smaller:
 - a. Bronze and Brass: Provide with solder-joint ends.
 - b. Bronze Angle: Class 125, bronze disc.
 - c. Ball: One piece, full port, brass or bronze with brass trim.

2.2 GENERAL REQUIREMENTS

- A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B. Valve Sizes: Match upstream piping unless otherwise indicated.

2.3 BRASS BALL VALVES

- A. One-Piece, Reduced-Port with Brass Trim:
 - 1. Comply with MSS SP-110.
 - 2. CWP Rating: 400 psig.
 - 3. Body: Forged brass.
 - 4. Ends: Threaded.
 - 5. Seats: PTFE or TFE.
 - 6. Stem: Brass.
 - 7. Ball: Chrome-plated brass.

2.4 BRONZE BALL VALVES

- A. One Piece, Reduced Port with Bronze Trim:
 - 1. Comply with MSS SP-110.
 - 2. SWP Rating: 400 psig.
 - 3. Body: Bronze.
 - 4. Ends: Threaded.
 - 5. Seats: PTFE or TFE

PART 3 EXECUTION

3.1 EXAMINATION

- A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.
- B. Verify valve parts to be fully operational in all positions from closed to fully open.
- C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D. Should valve is determined to be defective, replace with new valve.

3.2 INSTALLATION

- A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

END OF SECTION 22 05 23

**SECTION 22 05 53
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Tags.
- B. Pipe markers.

1.2 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.

1.3 SUBMITTALS

- A. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

PART 2 PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

- A. Piping: Tags.

2.2 PIPE MARKERS

- A. Manufacturers but not limited to:
 1. Brady Corporation: www.bradycorp.com/#sle.
 2. Brimar Industries, Inc: www.pipemarker.com/#sle.
 3. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
- B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install plastic pipe markers in accordance with manufacturer's instructions.

- C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

END OF SECTION 22 05 53

**SECTION 22 07 19
PLUMBING PIPING INSULATION**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.2 RELATED REQUIREMENTS

- A. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

1.3 REFERENCE STANDARDS

- A. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2016.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.
- C. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

1.4 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- B. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer but not limited to:
 - 1. Aeroflex USA, Inc: www.aeroflexusa.com/#sle.
 - 2. Armacell LLC; AP Armaflex: www.armacell.us/#sle.
 - 3. K-Flex USA LLC; Insul-Tube: www.kflexusa.com/#sle.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.

2. Maximum Service Temperature: 220 degrees F.
3. Connection: Waterproof vapor barrier adhesive.

2.3 JACKETS

- A. PVC Plastic.
 1. Manufacturers:
 - a. Johns Manville Corporation: www.jm.com/#sle.
 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
- D. Inserts and Shields:
 1. Application: Piping 1-1/2 inches diameter or larger.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
- E. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.
- F. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

3.3 SCHEDULES

- A. Plumbing Systems:
 1. Domestic Hot & Hot Water Recirculation Water Supply:
 - a. Cellular Foam Insulation:
 - 1) Pipe Size Range: 1 1/2 or less inch.
 - 2) Thickness: 1 inch.

2. Domestic Cold Water:
 - a. Thickness: 1 inch.
- 3.
4. Plumbing Vents Within 10 Feet of the Exterior:
 - a. Thickness: 1 inch.

END OF SECTION 22 07 19

**SECTION 22 10 05
PLUMBING PIPING**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Flanges, unions, and couplings.
 - 4. Pipe hangers and supports.
 - 5. Valves.

1.2 RELATED REQUIREMENTS

- A. Section 09 90 00 - Exterior & Interior Painting
- B. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
- C. Section 22 07 19 - Plumbing Piping Insulation.

1.3 REFERENCE STANDARDS

- A. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems; 2015.
- B. ANSI Z223.1 - National Fuel Gas Code; 2024.
- C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.
- D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2018.
- F. ASME B31.1 - Power Piping; 2020.
- G. ASME B31.9 - Building Services Piping; 2014.
- H. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.
- I. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2017.
- J. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- K. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2018a.
- L. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

- M. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2015a.
- N. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.
- O. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2016.
- P. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
- Q. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.
- R. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2012 (Reapproved 2018).
- S. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014.
- T. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2011.
- U. ASTM D2855 - Standard Practice for the Two-Step (Primer & Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2015.
- V. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2016.
- W. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2017.
- X. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2017.
- Y. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- Z. NSF 61 - Drinking Water System Components - Health Effects; 2017.
- AA. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.4 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. PVC Pipe: ASTM D2665 or ASTM D3034.

1. Fittings: PVC.
2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.3 SANITARY SEWER PIPING, ABOVE GRADE

- A. PVC Pipe: Schedule 40 solid core
1. Fittings: PVC.
 2. Joints: Solvent welded.

2.4 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Ductile Iron Pipe: AWWA C151/A21.51.
1. Fittings: Ductile or gray iron, standard thickness.
 2. Joints: AWWA C111/A21.11, styrene butadiene rubber (SBR) or vulcanized SBR gasket with 3/4 inch diameter rods.

2.5 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 2. Joints: ASTM B32, alloy Sn95 solder.

2.6 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
 2. Joints: Threaded or welded to ASME B31.1.

2.7 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
1. Ferrous pipe: Class 150 malleable iron threaded unions.

2.8 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 4. Vertical Pipe Support: Steel riser clamp.
 5. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
 - a. Bases: High density polypropylene.
 - b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.

- c. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 - d. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion resistant material.
 - e. Height: Provide minimum clearance of 6 inches under pipe to top of roofing.
- B. Plumbing Piping - Drain, Waste, and Vent:
 - 1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
 - 2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - C. Plumbing Piping - Water:
 - 1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
 - 2. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.

2.9 BALL VALVES

- A. Manufacturers but not limited to:
 - 1. Apollo Valves: www.apollovalves.com/#sle.
 - 2. Grinnell Products: www.grinnell.com/#sle.
 - 3. Nibco, Inc: www.nibco.com/#sle.

2.10 PIPING SPECIALTIES

- A. Flow Controls:
 - 1. Manufacturers but not limited to:
 - a. ITT Bell & Gossett: www.bellgossett.com/#sle.
 - b. Griswold Controls: www.griswoldcontrols.com/#sle.
 - c. Taco, Inc: www.taco-hvac.com/#sle.
 - 2. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
 - 3. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- G. Provide access where valves and fittings are not exposed.
- H. Install vent piping penetrating roofed areas to maintain integrity of roof assembly; refer to Section .
- I. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
 - 1. Painting of interior plumbing systems and components is specified in Section 09 90 00.
 - 2. Painting of exterior plumbing systems and components is specified in Section 09 90 00.
- J. Install water piping to ASME B31.9.
- K. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- L. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

3.3 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.

3.4 SERVICE CONNECTIONS

- A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

3.5 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe Size: 1/2 inches to 1-1/4 inches:
 - 1) Maximum Hanger Spacing: 6.5 ft.
 - 2) Hanger Rod Diameter: 3/8 inches.
 - b. Pipe Size: 1-1/2 inches to 2 inches:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 3/8 inch.
 - c. Pipe Size: 2-1/2 inches to 3 inches:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 1/2 inch.
 - d. Pipe Size: 4 inches to 6 inches:
 - 1) Maximum Hanger Spacing: 10 ft.

2) Hanger Rod Diameter: 5/8 inch.

END OF SECTION 22 10 05

**SECTION 22 10 06
PLUMBING PIPING SPECIALTIES**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Drains.
- B. Cleanouts.
- C. Hydrants.
- D. Refrigerator valve and recessed box.
- E. Water hammer arrestors.

1.2 RELATED REQUIREMENTS

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 40 00 - Plumbing Fixtures.

1.3 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASME A112.6.3 - Floor and Trench Drains; 2016.
- C. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2004, with Errata.
- D. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2011 (Reaffirmed 2016).
- E. NSF 61 - Drinking Water System Components - Health Effects; 2017.
- F. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.4 SUBMITTALS

- A. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Loose Keys for Outside Hose Bibbs: One.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.2 DRAINS

- A. Manufacturers but not limited to:
 - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 - 2. Josam Company: www.josam.com/#sle.
 - 3. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Floor Drain (FD-1):
 - 1. See schedule.

2.3 CLEANOUTS

- A. Manufacturers but not limited to:
 - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 - 2. Josam Company: www.josam.com/#sle.
 - 3. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Cleanouts at Exterior Surfaced Areas (CO):
 - 1. Round cast nickel bronze access frame and non-skid stainless steel cover.

2.4 HYDRANTS

- A. Manufacturers but not limited to:
 - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 - 2. Zurn Industries, LLC: www.zurn.com/#sle.
 - 3. WCM Industries Inc: www.woodfordmfg.com/.

2.5 REFRIGERATOR VALVE AND RECESSED BOX

- A. Box Manufacturers but not limited to:
 - 1. IPS Corporation/Water-Tite: www.ipscorp.com/#sle.
 - 2. Oatey Supply Chain Services, Inc: www.oatey.com/#sle.
 - 3. Viega LLC: www.viega.com/#sle.

2.6 WATER HAMMER ARRESTORS

- A. Manufacturers but not limited to:
 - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 - 2. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com/#sle.
 - 3. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Water Hammer Arrestors:

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Encase exterior cleanouts in concrete flush with grade.
- D. Install floor cleanouts at elevation to accommodate finished floor.
- E. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatory sinks, washing machine outlets, or any other quick closing valves.

END OF SECTION 22 10 06

**SECTION 22 40 00
PLUMBING FIXTURES**

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 10 06 - Plumbing Piping Specialties.

1.2 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping; 2015.
- C. ASME A112.18.1 - Plumbing Supply Fittings; 2018.
- D. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2013.
- E. NSF 61 - Drinking Water System Components - Health Effects; 2017.
- F. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.3 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.5 WARRANTY

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 REGULATORY REQUIREMENTS

- A. Comply with applicable codes for installation of plumbing systems.

2.3 FLUSH VALVE WATER CLOSETS

- A. Water Closets: Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.
 - 1. See plumbing fixture schedule for basis of design.
- B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
 - 1. See plumbing fixture schedule

2.4 WALL HUNG URINALS

- A. Urinals: Vitreous china, ASME A112.19.2, wall hung with side shields and concealed carrier.
 - 1. See plumbing schedule for basis of design.
- B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
 - 1. See plumbing schedule for basis of design
- C. Carriers:
 - 1. Manufacturers but not limited to:
 - a. JOSAM Company: www.josam.com/#sle.
 - b. Viega LLC: www.viega.com/#sle.
 - c. Zurn Industries, Inc: www.zurn.com/#sle.

2.5 LAVATORIES

- A. Lavatory Manufacturers:
 - 1. See plumbing schedule for basis of design

2.6 SINKS

- A. Sink Manufacturers:
 - 1. See plumbing schedule for basis of design.

2.7 SHOWERS

- A. Shower Manufacturers:
 - 1. See plumbing schedule for basis of design.

2.8 DRINKING FOUNTAINS

- A. Drinking Fountain Manufacturers:
 - 1. See plumbing schedule for basis of design.

2.9 SERVICE SINKS

- A. Service Sink Manufacturers:

1. See plumbing schedule for basis of design.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.
- C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.2 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide stainless steel flexible supplies to fixtures with quarter turn stops, reducers, and escutcheons.
- C. Install components level and plumb.

3.4 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.5 CLEANING

- A. Clean plumbing fixtures and equipment.

3.6 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Do not permit use of fixtures by construction personnel.
- C. Repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 22 40 00

SECTION 23 05 29
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Support and attachment components for equipment, piping, and other HVAC.

1.2 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General - Purpose Piping; 2014.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- E. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- F. MFMA-4 - Metal Framing Standards Publication; 2004.
- G. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.3 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
 - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.

3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 4. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Comply with MFMA-4.
 2. Channel Material:
 - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
- C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.
 - b. Piping up to 1 inch (27 mm) nominal: 1/4 inch diameter.
 - c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch diameter.
- D. Pipe Supports:
1. Liquid Temperatures Up To 122 degrees F:
 - a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
 - b. Support From Below: MSS SP-58 Types 35 through 38.
 2. Operating Temperatures from 122 to 446 degrees F:
 - a. Overhead Support: MSS SP-58 Type 1 or 3 through 12, with appropriate saddle of MSS SP-58 Type 40 for insulated pipe.
- E. Beam Clamps: MSS SP-58 Types 19 through 23, 25 or 27 through 30 based on required load.
1. Material: ASTM A36/A36M carbon steel or ASTM A181/A181M forged steel.
 2. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
- F. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.
- G. Non-Penetrating Rooftop Supports for Low-Slope Roofs:
1. Manufacturers but not limited to:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
 - b. Erico International Corporation, a brand of Pentair: www.erico.com/#sle.
 - c. Ferguson Enterprises Inc: www.fnw.com/#sle.
 - d. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
 2. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
 3. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.

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4. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
5. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.

H. Anchors and Fasteners:

1. Manufacturers but not limited to - Mechanical Anchors:
 - a. Hilti, Inc: www.us.hilti.com/#sle.
 - b. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com/#sle.
 - c. Simpson Strong-Tie Company Inc: www.strongtie.com/#sle.
2. Manufacturers but not limited to - Powder-Actuated Fastening Systems:
 - a. Hilti, Inc: www.us.hilti.com/#sle.
 - b. ITW Ramset, a division of Illinois Tool Works, Inc: www.ramset.com/#sle.
 - c. Powers Fasteners, Inc: www.powers.com/#sle.
 - d. Simpson Strong-Tie Company Inc: www.strongtie.com/#sle.
3. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
4. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
5. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
6. Hollow Masonry: Use toggle bolts.
7. Hollow Stud Walls: Use toggle bolts.
8. Steel: Use beam clamps, machine bolts, or welded threaded studs.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Equipment Support and Attachment:
 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.

2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- G. Secure fasteners according to manufacturer's recommended torque settings.
- H. Remove temporary supports.

END OF SECTION 23 05 29

SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Adhesive-backed duct markers.
- D. Stencils.
- E. Pipe markers.

1.2 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.

1.3 SUBMITTALS

- A. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

PART 2 PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

- A. Exhaust fans: Nameplates
- B. Ductwork: Duct Markers

2.2 NAMEPLATES

- A. Manufacturers but not limited to:
 - 1. Advanced Graphic Engraving, LLC; _____: www.advancedgraphicengraving.com/#sle.
 - 2. Brimar Industries, Inc; _____: www.pipemarker.com/#sle.
 - 3. Craftmark Pipe Markers; _____: www.craftmarkid.com/#sle.
- B. Letter Color: Black.
- C. Letter Height: 1/4 inch.
- D. Background Color: White.

2.3 ADHESIVE-BACKED DUCT MARKERS

- A. Material: High gloss acrylic adhesive-backed vinyl film 0.0032 inch; printed with UV and chemical resistant inks.
- B. Style: Individual Label.
- C. Color: Yellow/Black.

2.4 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- C. Install ductwork with duct makers. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION 23 05 53

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.

1.2 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.
- C. NEBB (TAB) - Procedural Standard for Testing, Adjusting and Balancing of Environmental Systems; 2019, with Errata (2022).
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.3 SUBMITTALS

- A. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Submit to the Engineer .
 - 2. Include at least the following in the plan:
 - a. List of all air flow & system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Identification and types of measurement instruments to be used and their most recent calibration date.
 - d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - e. Final test report forms to be used.
 - f. Procedures for formal deficiency reports, including scope, frequency and distribution.
- B. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
 - 3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 5. Units of Measure: Report data in I-P (inch-pound) units only.
 - 6. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.

- b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Project Engineer.
 - g. Project Contractor.
 - h. Report date.
- C. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 - 1. AABC (NSTSB), AABC National Standards for Total System Balance.
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
 - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 - 2. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.2 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 4. Fans are rotating correctly.
 - 5. Fire and volume dampers are in place and open.
 - 6. Air coil fins are cleaned and combed.
 - 7. Access doors are closed and duct end caps are in place.
 - 8. Air outlets are installed and connected.
 - 9. Duct system leakage is minimized.

- B. Beginning of work means acceptance of existing conditions.

3.3 PREPARATION

- A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
 - 1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to engineer to facilitate spot checks during testing.

3.4 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.5 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
 - 1. Running log of events and issues.
 - 2. Discrepancies, deficient or uncompleted work by others.
 - 3. Contract interpretation requests.
 - 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.6 AIR SYSTEM PROCEDURE

- A. DX Packaged Rooftop Unit, DX Split, Fan Coil Unit, MUA units and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

- E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- H. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- I. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

END OF SECTION 23 05 93

SECTION 23 07 13 - DUCT INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Duct insulation.
- B. Duct liner.

1.2 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.
- B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2016.
- C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- D. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2016.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.
- F. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.3 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.5 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
 - 1. Johns Manville: www.jm.com/#sle.
 - 2. JP Lamborn Co; Thermal Sleeve MT: www.jpflex.com/#sle.
 - 3. Knauf Insulation; Atmosphere Duct Wrap: www.knaufinsulation.com/#sle.
 - 4. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
 - 5. CertainTeed Corporation: www.certainteed.com/#sle.
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
 - 1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.

2.3 DUCT LINER

- A. Manufacturers but not limited to:
 - 1. Johns Manville: www.jm.com/#sle.
 - 2. Knauf Insulation: www.knaufinsulation.com/#sle.
 - 3. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
 - 4. CertainTeed Corporation: www.certainteed.com/#sle.
- B. Elastomeric Foam Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1, in sheet form.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 180 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.
- C. Glass Fiber Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
 - 1. Fungal Resistance: No growth when tested according to ASTM G21.
 - 2. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
 - 3. Service Temperature: Up to 250 degrees F.
 - 4. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
 - 5. Minimum Noise Reduction Coefficients:
 - a. 1 inch Thickness: 0.45.
- D. Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that ducts have been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.3 SCHEDULES

- A. Exhaust Ducts Within 10 ft of Exterior Openings: 1 1/2" fiberglass wrap.
- B. Outside Air Intake Ducts: 2" fiberglass wrap.
- C. Supply Ducts: 1" liner
- D. Return Ducts: 1" liner
- E. Round supply ducts: 1 1/2" wrap
- F. Ducts Exposed to Outdoors: See detail on plan sheets.

END OF SECTION 23 07 13

SECTION 23 07 19 - HVAC PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.2 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 C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.
- D. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2016.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.3 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.4 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
 - 1. Aeroflex USA, Inc; Aerocel ULP: www.aeroflexusa.com/#sle.
 - 2. Armacell LLC; AP Armaflex: www.armacell.us/#sle.
 - 3. K-Flex USA LLC; K-Flex Titan: www.kflexusa.com/#sle.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 180 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.

2.3 JACKETS

- A. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
 - 1. Thickness: 0.016 inch sheet.
 - 2. Finish: Smooth.
 - 3. Joining: Longitudinal slip joints and 2 inch laps.
 - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 - 5. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Insulated pipes conveying fluids below ambient temperature; insulate entire system.
- D. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. .
- E. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with aluminum jacket.
- F. Exterior Applications: Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.3 SCHEDULE

- A. Heating & Cooling Systems:
 - 1. Interior Refrigerant Hot Gas & Suction: 3/4" Flexible elastomeric cellular.

2. Exterior Refrigerant Hot Gas & Suction: 2" Flexible elastomeric cellular. with aluminum jacket.

END OF SECTION 23 07 19

SECTION 23 23 00 - REFRIGERANT PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Piping.

1.2 RELATED REQUIREMENTS

- A. Section 23 07 19 - HVAC Piping Insulation.

1.3 REFERENCE STANDARDS

- A. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2018.
- B. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2018.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- D. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.
- E. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2016.
- F. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2016.
- G. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011 (Amended 2012).
- H. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.4 SUBMITTALS

- A. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.
- B. Design Data: Submit design data indicating pipe sizing. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.

PART 2 PRODUCTS

2.1 PIPING

- A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
 - 1. Fittings: ASME B16.22 wrought copper.
 - 2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.

- B. Copper Tube to 7/8 inch OD: ASTM B88 (ASTM B88M), Type K (A), annealed.
 - 1. Fittings: ASME B16.26 cast copper.
 - 2. Joints: Flared.

- C. Pipe Supports and Anchors:
 - 1. Provide hangers and supports that comply with MSS SP-58.
 - a. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 4. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 5. Vertical Support: Steel riser clamp.
 - 6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
 - 7. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
 - 8. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.
 - 9. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
 - a. Bases: High density, UV tolerant, polypropylene or reinforced PVC.
 - b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - c. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 - d. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion resistant material.
 - e. Height: Provide minimum clearance of 6 inches under pipe to top of roofing.

PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Pipe Hangers and Supports:

1. Place hangers within 12 inches of each horizontal elbow.
 2. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 3. Provide copper plated hangers and supports for copper piping.
- F. Arrange piping to return oil to compressor.
- G. Provide clearance for installation of insulation and access to valves and fittings.
- H. Flood piping system with nitrogen when brazing.
- I. Insulate piping and equipment; refer to Section and Section 22 07 16.
- J. Fully charge completed system with refrigerant after testing.

3.3 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 2. 1-1/8 inch OD: Maximum span, 6 feet; minimum rod size, 1/4 inch.
 3. 1-3/8 inch OD: Maximum span, 7 feet; minimum rod size, 3/8 inch.
 4. 1-5/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.

END OF SECTION 23 23 00

SECTION 23 31 00 - HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal ductwork.

1.2 RELATED REQUIREMENTS

- A. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.
- B. Section 23 07 13 - Duct Insulation: External insulation and duct liner.
- C. Section 23 33 00 - Air Duct Accessories.
- D. Section 23 37 00 - Air Outlets and Inlets.

1.3 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; 2018.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).

1.4 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.1 DUCT ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to comply with SMACNA standards.
- B. Ducts: Galvanized steel, unless otherwise indicated.
- C. Medium and High Pressure Supply: 1 inch w.g. pressure class, galvanized steel.
- D. Transfer Air and Sound Boots: 1/2 inch w.g. pressure class, fibrous glass.

2.2 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.

2.3 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

2.4 MANUFACTURED DUCTWORK AND FITTINGS

- A. Round Ducts: Round lockseam duct with galvanized steel outer wall.
 - 1. Manufacture in accordance with SMACNA (DCS).
- B. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.
 - 1. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
 - 2. Maximum Velocity: 4000 fpm.
 - 3. Temperature Range: Minus 10 degrees F to 160 degrees F.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Connect diffusers boots to low pressure ducts directly or within 8 feet maximum length of flexible duct held in place with strap or clamp.

END OF SECTION 23 31 00

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Air turning devices/extractors.
- B. Backdraft dampers - metal.
- C. Duct access doors.
- D. Flexible duct connections.
- E. Volume control dampers.

1.2 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2018.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.1 AIR TURNING DEVICES/EXTRACTORS

- A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.2 BACKDRAFT DAMPERS - METAL

- A. Manufacturers but not limited to:
 - 1. Louvers & Dampers, Inc, a brand of Mestek, Inc: www.louvers-dampers.com/#sle.
 - 2. Nailor Industries, Inc: www.nailor.com/#sle.
 - 3. Ruskin Company: www.ruskin.com/#sle.

2.3 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
 - 1. Less Than 12 inches Square: Secure with sash locks.
 - 2. Up to 18 inches Square: Provide two hinges and two sash locks.

3. Up to 24 by 48 inches: Three hinges and two compression latches with outside and inside handles.

2.4 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.

2.5 VOLUME CONTROL DAMPERS

- A. Manufacturers but not limited to:
 1. Louvers & Dampers, Inc, a brand of Mestek, Inc; _____: www.louvers-dampers.com/#sle.
 2. Nailor Industries, Inc: www.nailor.com/#sle.
 3. Ruskin Company: www.ruskin.com/#sle.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Single Blade Dampers:
 1. Fabricate for duct sizes up to 6 by 30 inch.
- D. Quadrants:
 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- D. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- E. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- F. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION 23 33 00

SECTION 23 37 00 - AIR OUTLETS AND INLETS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Diffusers.
- B. Registers/grilles.

1.2 REFERENCE STANDARDS

- A. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

PART 2 PRODUCTS

2.1 MANUFACTURERS but not limited to

- A. Hart & Cooley, Inc; ____: www.hartandcooley.com/#sle.
- B. Price Industries: www.price-hvac.com/#sle.
- C. Titus, a brand of Air Distribution Technologies: www.titus-hvac.com/#sle.

2.2 RECTANGULAR CEILING DIFFUSERS

- A. Type: Provide square and rectangular, adjustable pattern diffuser to discharge air in 360 degree, three way, and four way pattern.
- B. Color: As indicated on drawings.
- C. Accessories: Provide butterfly volume control damper; with damper adjustable from diffuser face.

2.3 CEILING EGG CRATE EXHAUST AND RETURN GRILLES

- A. Manufacturers:
 - 1. See air device schedule for basis of design..

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Comply with SMACNA (ASMM) for flashing/counter-flashing of roof penetrations and supports for roof curbs and roof mounted equipment.

- C. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black.

END OF SECTION 23 37 00

SECTION 23 74 16 - PACKAGED ROOFTOP AIR-CONDITIONING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Packaged, intermediate-capacity, rooftop air-conditioning units.

1.2 REFERENCE STANDARDS

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008, Including All Addenda.

1.3 SUBMITTALS

- A. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
- B. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.4 WARRANTY

- A. Provide a five year warranty to include coverage for refrigeration compressors.

PART 2 PRODUCTS

2.1 PACKAGED, INTERMEDIATE-CAPACITY, ROOFTOP AIR-CONDITIONING UNITS

- A. Manufacturers:
 - 1. Johnson Controls International, PLC; _____: www.johnsoncontrols.com/#sle.
 - 2. Trane, a brand of Ingersoll Rand; _____: www.trane.com/#sle.
 - 3. Daikin.
- B. General: Roof mounted units having gas burner and electric refrigeration that are 7.5 tons to 25 tons in capacity.
- C. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, return fan, heat exchanger and burner, heat recovery coil, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.

2.2 CASING

- A. Cabinet: Steel with baked enamel finish, including access panels with screwdriver-operated flush, cam type fasteners. Structural members to be minimum 18 gauge, 0.0478 inch, with access doors or panels of minimum 20 gauge, 0.0359 inch.

2.3 FANS

- A. Supply and Return Fan: Forward curved centrifugal type, resiliently mounted with V-belt drive, adjustable variable pitch pulley, and rubber isolated hinge mounted. Provide with high efficiency motor or direct drive as indicated. Isolate complete fan assembly. See Section 23 05 48.

2.4 BURNERS

- A. Gas Burner: Atmospheric type burner with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame-sensing device, and automatic 100 percent shutoff pilot.
- B. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor, and after airflow proven and slight delay, allow gas valve to open.

2.5 EVAPORATOR COIL

- A. Provide copper tube aluminum fin coil assembly with galvanized drain pan and connection.
- B. Provide capillary tubes or thermostatic expansion valves for units of 6 tons capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 tons cooling capacity and larger.

2.6 CONDENSER COIL

- A. Provide copper tube aluminum fin coil assembly with subcooling rows and coil guard.
- B. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.

2.7 COMPRESSORS

- A. Provide hermetic compressors, 3600 rpm maximum, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gauge ports, and filter drier.

2.8 Air Filters:

- A. 2-inch thick, glass fiber disposable media in metal frames.

2.9 OPERATING CONTROLS

- A. Provide low voltage, adjustable room thermostat to control burner operation, compressor and condenser fan, and supply fan to maintain temperature setting.
 - 1. Include system selector switch heat-off-cool and auto-on fan control switch.
 - 2. Locate thermostat in room as indicated on drawings.
- B. Provide remote-mounted auto-on fan control switch.

2.10 ROOF CURBS

- A. Insulating Roof Mounting Curb: 20" tall.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that roof is ready to receive work and opening dimensions are as required by manufacturer.
- B. Verify that proper power supply is available.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

3.3 SYSTEM STARTUP

- A. Prepare and start equipment. Adjust for proper operation.

3.4 MAINTENANCE

- A. Provide service and maintenance of packaged rooftop units for one year from Date of Substantial Completion.
- B. Provide routine maintenance service with a two-month interval as maximum time period between calls.
- C. Include maintenance items as outlined in manufacturer's operating and maintenance data, including minimum of two filter replacements, minimum of one fan belt replacement, and controls check-out, adjustments, and recalibration.
- D. After each service call, submit copy of service call work order or report that includes description of work performed.

3.5 SCHEDULES

- A. See sheet M601 RTU schedule.

END OF SECTION 23 74 16

SECTION 23 81 19 - SELF-CONTAINED AIR-CONDITIONERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Packaged terminal heat pump units.
- B. Controls.

1.2 SUBMITTALS

- A. Product Data: Provide drawings indicating dimensions, rough-in connections, and electrical characteristics and connection requirements.
- B. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.3 WARRANTY

- A. Provide a five year warranty to include coverage for refrigeration compressors.

PART 2 PRODUCTS

2.1 AIR CONDITIONING UNITS

- A. Description: Packaged, self-contained, through-the-wall air cooled terminal heat pump units, with wall sleeve, room cabinet, electric refrigeration system, electric heating, outside air louvers, built-in temperature controls; fully charged with refrigerant and filled with oil.
- B. Electrical Characteristics: See plans
- C. Energy Efficiency: See plans

2.2 CABINET

- A. Discharge Grille and Access Door: Removable punched louver discharge grilles, allowing 4-way discharge air pattern with hinged door in top of cabinet for access to controls.

2.3 CHASSIS

- A. Refrigeration System:
 - 1. Direct expansion cooling coil.
 - 2. Hermetically sealed compressor with internal spring isolation, external isolation, permanent split capacitor motor and overload protection.
 - 3. Accumulator.

- B. Air System: Centrifugal forward curved tangential evaporator fans with two speed permanent split capacitor motor, permanent washable filters, positive pressure ventilation damper with concealed manual operator.
- C. Condensate Drain: Drain pan to direct condensate to condenser coil for re-evaporation.

2.4 CONTROLS

- A. Control Module: Remote mounted adjustable thermostat with heat anticipator, heat-off-cool switch, high-low fan switch.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Coordinate installation of units with architectural, mechanical, and electrical work.

END OF SECTION 23 81 19

SECTION 23 81 26.13 - SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Forced air furnaces.
- B. Air cooled condensing units.
- C. Indoor air handling (fan and coil) units for ducted systems.
- D. Controls.

1.2 REFERENCE STANDARDS

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008, Including All Addenda.
- B. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; 2004.
- C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2013.
- D. ASHRAE Std 23 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Compressor Units; 2022.
- E. NEMA MG 00001 - Motors and Generators; 2024.
- F. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2018.
- G. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2018.
- H. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.3 SUBMITTALS

- A. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- B. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.4 WARRANTY

- A. Provide five year manufacturers warranty for heat exchangers and compressors.

PART 2 PRODUCTS

2.1 SYSTEM DESIGN

- A. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
 - 1. Heating: Natural gas fired.
 - 2. Cooling: Outdoor electric condensing unit with evaporator coil in central ducted indoor unit.
 - 3. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.
- B. Performance Requirements: See Drawings for additional requirements.

2.2 INDOOR AIR HANDLING UNITS FOR DUCTED SYSTEMS

- A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating and cooling element(s), controls, and accessories; wired for single power connection with control transformer.
 - 1. Air Flow Configuration: Upflow.
 - 2. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
- B. Supply Fan: Centrifugal type rubber mounted with direct or belt drive with adjustable variable pitch motor pulley.
 - 1. Motor: NEMA MG 1; 1750 rpm single speed, permanently lubricated, hinge mounted.
 - 2. Motor Electrical Characteristics:
- C. Air Filters: 1 inch thick urethane, washable type arranged for easy replacement.
- D. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
 - 1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
 - 2. Manufacturers: System manufacturer.

2.3 OUTDOOR UNITS

- A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
 - 1. Comply with AHRI 210/240.
 - 2. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23 and UL 207.
- B. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
- C. Accessories: Filter drier, high-pressure switch (manual reset), low pressure switch (automatic reset), service valves and gauge ports, thermometer well (in liquid line).
 - 1. Provide thermostatic expansion valves.
- D. Operating Controls:

1. Control by room thermostat to maintain room temperature setting.

2.4 GAS FURNACE COMPONENTS

- A. Burner: Atmospheric type with adjustable combustion air supply,
 1. Gas valve, two stage provides 100 percent safety gas shut-off; 24 volt combining pressure regulation, safety pilot, manual set (On-Off), pilot filtration, automatic electric valve.
 2. Combustion air damper with synchronous spring return damper motor.
 3. Non-corrosive combustion air blower with permanently lubricated motor.
- B. Burner Safety Controls:
 1. Thermocouple Sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure.
 2. Flame Rollout Switch: Installed on burner box and prevents operation.
 3. Vent Safety Shutoff Sensor: Temperature sensor installed on draft hood and prevents operation, manual reset.
 4. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.
- C. Operating Controls:
 1. Cycle burner by room thermostat to maintain room temperature setting.
 2. Supply fan energized from bonnet temperature independent of burner controls, with adjustable timed off delay and fixed timed on delay, with manual switch for continuous fan operation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- B. Verify that proper power supply is available and in correct location.
- C. Verify that proper fuel supply is available for connection.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.
- B. Install in accordance with NFPA 90A and NFPA 90B.
- C. Install refrigeration systems in accordance with ASHRAE Std 15.

END OF SECTION 23 81 26.13

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Single conductor building wire.
- B. Metal-clad cable.
- C. Wiring connectors.

1.2 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- C. Section 26 05 36 - Cable Trays for Electrical Systems: Additional installation requirements for cables installed in cable tray systems.
- D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011 (Reapproved 2017).
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); 2012.
- G. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- J. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

- K. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- L. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- M. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.5 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Metal-clad cable is permitted only as follows:
 - 1. Where not otherwise restricted, may be used:
 - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
 - 1) Maximum Length: 6 feet.
 - b. Where concealed in hollow stud walls and above accessible ceilings for branch circuits up to 20 A.

2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.

- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
- H. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - 3. Color Code:
 - a. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - b. 240/120 V, 1 Phase, 3 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Neutral/Grounded: White.
 - c. Equipment Ground, All Systems: Green.

2.3 SINGLE CONDUCTOR BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Conductor Stranding:
 - 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation:
 - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

2.4 METAL-CLAD CABLE

- A. Manufacturers:
 - 1. AFC Cable Systems Inc: www.afcweb.com/#sle.
 - 2. Encore Wire Corporation: www.encorewire.com/#sle.
 - 3. Southwire Company: www.southwire.com/#sle.
- B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- C. Conductor Stranding:
 - 1. Size 10 AWG and Smaller: Solid.
 - 2. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- F. Grounding: Full-size integral equipment grounding conductor.
- G. Armor: Steel, interlocked tape.

2.5 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 26 05 26.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 - 2. When circuit destination is indicated without specific routing, determine exact routing required.
 - 3. Arrange circuiting to minimize splices.

4. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install metal-clad cable (Type MC) in accordance with NECA 120.
- E. Installation in Raceway:
 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 2. Pull all conductors and cables together into raceway at same time.
 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- H. Terminate cables using suitable fittings.
 1. Metal-Clad Cable (Type MC):
 - a. Use listed fittings.
 - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- I. Install conductors with a minimum of 12 inches of slack at each outlet.
- J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- L. Make wiring connections using specified wiring connectors.
 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 3. Do not remove conductor strands to facilitate insertion into connector.
 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminants. Do not use wire brush on plated connector surfaces.
- M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
- N. Insulate ends of spare conductors using vinyl insulating electrical tape.

- O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- P. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.

1.2 RELATED REQUIREMENTS

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 26 56 00 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

1.3 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.4 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.1 GROUNDING AND BONDING REQUIREMENTS

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- D. Separately Derived System Grounding:

1. Separately derived systems include, but are not limited to:
 - a. Transformers (except autotransformers such as buck-boost transformers).
2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
4. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
5. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.

E. Bonding and Equipment Grounding:

1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

2.2 GROUNDING AND BONDING COMPONENTS

A. General Requirements:

1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:

1. Use insulated copper conductors unless otherwise indicated.

C. Connectors for Grounding and Bonding:

1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 4. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- D. Identify grounding and bonding system components in accordance with Section 26 05 53.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.2 RELATED REQUIREMENTS

- A. Section 26 05 33.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- B. Section 26 05 33.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.
- C. Section 26 51 00 - Interior Lighting: Additional support and attachment requirements for interior luminaires.
- D. Section 26 56 00 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

1.3 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.

4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

1.5 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
 6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 1. Comply with MFMA-4.
 2. Channel Material:
 - a. Indoor Dry Locations: Use painted steel or zinc-plated steel.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
 3. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch.
 4. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.
 - b. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
- F. Non-Penetrating Rooftop Supports for Low-Slope Roofs: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
 1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
 3. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.

3.3 FIELD QUALITY CONTROL

- A. Inspect support and attachment components for damage and defects.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION 26 05 29

SECTION 26 05 33.13 - CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Flexible metal conduit (FMC).
- C. Electrical metallic tubing (EMT).
- D. Conduit fittings.

1.2 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Metal clad cable (Type MC), armored cable (Type AC), and manufactured wiring systems, including uses permitted.
- C. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- D. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 21 00 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.

1.3 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2015.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2015.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- H. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- I. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

- J. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
 - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
 - 5. Notify engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.5 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.1 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- D. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- E. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- F. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
- G. Exposed, Exterior: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
- H. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
 - 1. Maximum Length: 6 feet.

- I. Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit.
- J. Fished in Existing Walls, Where Necessary: Use flexible metal conduit.

2.2 CONDUIT REQUIREMENTS

- A. Electrical Service Conduits: Also comply with Section 26 21 00.
- B. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
 - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel.
 - 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.4 FLEXIBLE METAL CONDUIT (FMC)

- A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.5 ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel.
 - 3. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated without specific routing, determine exact routing required.
 - 3. Conceal all conduits unless specifically indicated to be exposed.
 - 4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Within joists in areas with no ceiling.
 - 5. Unless otherwise approved, do not route conduits exposed:
 - a. Across floors.
 - b. Across roofs.
 - c. Across top of parapet walls.
 - d. Across building exterior surfaces.
 - 6. Arrange conduit to maintain adequate headroom, clearances, and access.
 - 7. Route conduits above water and drain piping where possible.
 - 8. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
- E. Conduit Support:
 - 1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 - 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
- F. Connections and Terminations:
 - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 - 3. Use suitable adapters where required to transition from one type of conduit to another.
 - 4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 - 5. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.

6. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- G. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 4. Conceal bends for conduit risers emerging above ground.
 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
 8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- H. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 2. Where conduits are subject to earth movement by settlement or frost.
- I. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- J. Provide grounding and bonding in accordance with Section 26 05 26.

3.3 FIELD QUALITY CONTROL

- A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- B. Correct deficiencies and replace damaged or defective conduits.

3.4 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

END OF SECTION 26 05 33.13

SECTION 26 05 33.16 - BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Boxes and enclosures for integrated power, data, and audio/video.

1.2 RELATED REQUIREMENTS

- A. Section 08 31 00 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 33.13 - Conduit for Electrical Systems:
 - 1. Conduit bodies and other fittings.
- D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 27 26 - Wiring Devices:
 - 1. Wall plates.
 - 2. Additional requirements for locating boxes for wiring devices.

1.3 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
- E. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels; 2013.

- J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.5 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 BOXES

A. General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled as suitable for the purpose intended.
4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:

1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
2. Use cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Use cast aluminum boxes where exposed galvanized steel rigid metal conduit is used.

4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 6. Use shallow boxes where required by the type of wall construction.
 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Wall Plates: Comply with Section 26 27 26.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA EN 10250 Environment Type, Unless Otherwise Indicated:
 - a. Indoor Clean, Dry Locations: Type 1, painted steel.
 - b. Outdoor Locations: Type 3R, painted steel.
 3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- E. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- F. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

- G. Box Locations:
1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 31 00 as required where approved by the Architect.
 2. Unless dimensioned, box locations indicated are approximate.
 3. Locate boxes as required for devices installed under other sections or by others.
 - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 27 26.
 - b. Communications Systems Outlets: Comply with Section 27 10 00.
 4. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
 - a. Concealed above accessible suspended ceilings.
 - b. Within joists in areas with no ceiling.
 - c. Electrical rooms.
 - d. Mechanical equipment rooms.
- H. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
 3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
- I. Install boxes plumb and level.
- J. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- K. Install boxes as required to preserve insulation integrity.
- L. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- N. Close unused box openings.
- O. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- P. Provide grounding and bonding in accordance with Section 26 05 26.
- Q. Identify boxes in accordance with Section 26 05 53.

3.3 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

END OF SECTION 26 05 33.16

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Warning signs and labels.

1.2 RELATED REQUIREMENTS

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- B. Section 26 27 26 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.

1.3 REFERENCE STANDARDS

- A. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. NFPA 70E - Standard for Electrical Safety in the Workplace; 2024.
- D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.1 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Panelboards:
 - 1) Identify voltage, phase & panel name.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - 3) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
 - b. Transformers:
 - 1) Identify kVA rating.
 - 2) Identify voltage and phase for primary and secondary.

- 3) Identify power source and circuit number. Include location when not within sight of equipment.
 2. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
 3. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
 - a. Service equipment.
 - b. Industrial control panels.
 - c. Motor control centers.
 - d. Elevator control panels.
 - e. Industrial machinery.
 4. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
 - a. Minimum Size: 3.5 by 5 inches.
 - b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
- B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
- C. Identification for Devices:
1. Wiring Device and Wallplate Finishes: Comply with Section 26 27 26.
 2. Use identification label to identify serving branch circuit for all receptacles.
 3. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.

2.2 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic or aluminum nameplates suitable for exterior use.
 2. Plastic Nameplates: Two-layer or three-layer laminated electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
 3. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Format for Equipment Identification:

1. Minimum Size: 1 inch by 2.5 inches.
2. Legend:
 - a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
 - a. Equipment Designation: 1/2 inch.
5. Color:
 - a. Normal Power System: White text on black background.

D. Format for Receptacle Identification:

1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Power source and circuit number or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Black text on clear background.

2.3 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:

1. Materials:
2. Minimum Size: 7 by 10 inches unless otherwise indicated.

C. Warning Labels:

1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:

1. Surface-Mounted Equipment: Enclosure front.
2. Flush-Mounted Equipment: Inside of equipment door.
3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
4. Elevated Equipment: Legible from the floor or working platform.
5. Interior Components: Legible from the point of access.
6. Conductors and Cables: Legible from the point of access.
7. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

3.2 FIELD QUALITY CONTROL

- A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION 26 05 53

SECTION 26 05 73 - POWER SYSTEM STUDIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Protective device coordination study.
- B. Arc flash and shock risk assessment.
 - 1. Includes arc flash hazard warning labels.
- C. Criteria for the selection and adjustment of equipment and associated protective devices not specified in this section, as determined by studies to be performed.

1.2 RELATED REQUIREMENTS

- A. Section 26 05 53 - Identification for Electrical Systems: Additional requirements for arc flash hazard warning labels.

1.3 REFERENCE STANDARDS

- A. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.
- B. IEEE 242 - IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems; 2001, with Errata (2003).
- C. IEEE 399 - IEEE Recommended Practice for Industrial and Commercial Power Systems Analysis; 1997.
- D. IEEE 1584 - IEEE Guide for Performing Arc-Flash Hazard Calculations; 2018, with Errata (2019).
- E. NEMA MG 00001 - Motors and Generators; 2024.
- F. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. NFPA 70E - Standard for Electrical Safety in the Workplace; 2024.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work to provide equipment and associated protective devices complying with criteria for selection and adjustment, as determined by studies to be performed.
 - 2. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Submit study reports prior to or concurrent with product submittals.

2. Do not order equipment until matching study reports and product submittals have both been evaluated by Architect.

1.5 SUBMITTALS

- A. Study reports, stamped or sealed and signed by study preparer.

1.6 POWER SYSTEM STUDIES

- A. Scope of Studies:
 1. Perform analysis of new electrical distribution system.
 2. Except where study descriptions below indicate exclusions, analyze system at each bus from primary protective devices of utility source down to each piece of equipment involved, including parts of system affecting calculations being performed (e.g. fault current contribution from motors).
 3. Include in analysis alternate sources and operating modes (including known future configurations) to determine worst case conditions.
- B. General Study Requirements:
 1. Comply with NFPA 70.
 2. Perform studies utilizing computer software complying with specified requirements; manual calculations are not permitted.
- C. Data Collection:
 1. Compile information on project-specific characteristics of actual installed equipment, protective devices, feeders, etc. as necessary to develop single-line diagram of electrical distribution system and associated input data for use in system modeling.
 - a. Utility Source Data: Include primary voltage, maximum and minimum three-phase and line-to-ground fault currents, impedance, X/R ratio, and primary protective device information.
 - 1) Obtain up-to-date information from Utility Company.
 - b. Generators: Include manufacturer/model, kW and voltage ratings, and impedance.
 - c. Motors: Include manufacturer/model, type (e.g. induction, synchronous), horsepower rating, voltage rating, full load amps, and locked rotor current or NEMA MG 00001 code letter designation.
 - d. Transformers: Include primary and secondary voltage ratings, kVA rating, winding configuration, percent impedance, and X/R ratio.
 - e. Protective Devices:
 - 1) Circuit Breakers: Include manufacturer/model, type (e.g. thermal magnetic, electronic trip), frame size, trip rating, voltage rating, interrupting rating, available field-adjustable trip response settings, and features (e.g. zone selective interlocking).
 - 2) Fuses: Include manufacturer/model, type/class (e.g. Class J), size/rating, and speed (e.g. time delay, fast acting).
 - f. Protective Relays: Include manufacturer/model, type, settings, current/potential transformer ratio, and associated protective device.
 - g. Conductors: Include feeder size, material (e.g. copper, aluminum), insulation type, voltage rating, number per phase, raceway type, and actual length.
- D. Protective Device Coordination Study:
 1. Comply with applicable portions of IEEE 242 and IEEE 399.

2. Analyze alternate scenarios considering known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
- E. Arc Flash and Shock Risk Assessment:
1. Comply with NFPA 70E.
 2. Perform incident energy and arc flash boundary calculations in accordance with IEEE 1584 (as referenced in NFPA 70E Annex D), where applicable.
 3. Analyze alternate scenarios considering conditions that may result in maximum incident energy, including but not limited to:
 - a. Maximum and minimum utility fault currents.
 - b. Maximum and minimum motor contribution.
 - c. Known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
- F. Study Reports:
1. General Requirements:
 - a. Identify date of study and study preparer.
 - b. Identify study methodology and software product(s) used.
 - c. Identify scope of studies, assumptions made, implications of possible alternate scenarios, and any exclusions from studies.
 - d. Identify base used for per unit values.
 - e. Include single-line diagram and associated input data used for studies; identify buses on single-line diagram as referenced in reports, and indicate bus voltage.
 - f. Include conclusions and recommendations.
 2. Protective Device Coordination Study:
 - a. For each scenario, include time-current coordination curves plotted on log-log scale graphs.
 - b. For each graph include (where applicable):
 - 1) Partial single-line diagram identifying the portion of the system illustrated.
 - 2) Protective Devices: Time-current curves with applicable tolerance bands for each protective device in series back to the source, plotted up to the maximum available fault current at the associated bus.
 - 3) Conductors: Damage curves.
 - 4) Transformers: Inrush points and damage curves.
 - 5) Generators: Full load current, overload curves, decrement curves, and short circuit withstand points.
 - 6) Motors: Full load current, starting curves, and damage curves.
 - 7) Capacitors: Full load current and damage curves.
 - c. For each protective device, identify fixed and adjustable characteristics with available ranges and recommended settings.
 - 1) Circuit Breakers: Include long time pickup and delay, short time pickup and delay, and instantaneous pickup.
 - 2) Include ground fault pickup and delay.
 - 3) Include fuse ratings.
 - 4) Protective Relays: Include current/potential transformer ratios, tap, time dial, and instantaneous pickup.
 - d. Identify cases where either full selective coordination or adequate protection is not achieved, along with recommendations.
 3. Arc Flash and Shock Risk Assessment:

- a. For each scenario, identify at each bus location:
 - 1) Calculated incident energy and associated working distance.
 - 2) Calculated arc flash boundary.
- b. For purposes of producing arc flash hazard warning labels, summarize the maximum incident energy and associated data reflecting the worst case condition of all scenarios at each bus location.

1.7 QUALITY ASSURANCE

- A. Computer Software for Study Preparation: Use the latest edition of commercially available software utilizing specified methodologies.
 - 1. Acceptable Software Products:
 - a. EasyPower LLC: www.easypower.com/#sle.
 - b. ETAP/Operation Technology, Inc: www.etap.com/#sle.
 - c. SKM Systems Analysis, Inc: www.skm.com/#sle.

PART 2 PRODUCTS

2.1 ARC FLASH HAZARD WARNING LABELS

- A. Provide warning labels complying with ANSI Z535.4 to identify arc flash hazards for each work location analyzed by the arc flash and shock risk assessment.
 - 1. Materials: Comply with Section 26 05 53.
 - 2. Legend: Provide custom legend in accordance with NFPA 70E based on equipment-specific data as determined by arc flash and shock risk assessment.
 - a. Include the following information:
 - 1) Arc flash boundary.
 - 2) Available incident energy and corresponding working distance.
 - 3) Nominal system voltage.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Adjust equipment and protective devices for compliance with studies and recommended settings.
- C. Notify Architect of any conflicts with or deviations from studies. Obtain direction before proceeding.

END OF SECTION 26 05 73

SECTION 26 21 00 - LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Electrical service requirements.

1.2 RELATED REQUIREMENTS

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

- A. IEEE C2 - National Electrical Safety Code; 2017.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.
- B. Coordination:
 - 1. Verify the following with Utility Company representative:
 - a. Utility Company requirements, including division of responsibility.
 - b. Exact location and details of utility point of connection.
 - c. Utility easement requirements.
 - d. Utility Company charges associated with providing service.
 - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
 - 3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
- D. Utility Company charges associated with providing permanent service to be paid by Owner.

- E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.
- F. Scheduling:
 - 1. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.5 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.

1.6 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. IEEE C2 (National Electrical Safety Code).
 - 2. NFPA 70 (National Electrical Code).
 - 3. The requirements of the Utility Company.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Store products indoors in a clean, dry space having a uniform temperature to prevent condensation (including outdoor rated products which are not weatherproof until completely and properly installed). Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle products carefully to avoid damage to internal components, enclosure, and finish.

PART 2 PRODUCTS

2.1 ELECTRICAL SERVICE REQUIREMENTS

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
- B. Electrical Service Characteristics: As indicated on drawings.
- C. Division of Responsibility: As indicated on drawings.
- D. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.

- B. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

- A. Verify and mark locations of existing underground utilities.

3.3 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required support and attachment components in accordance with Section 26 05 29.
- E. Provide grounding and bonding for service entrance equipment in accordance with Section 26 05 26.
- F. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 05 53.

END OF SECTION 26 21 00

SECTION 26 24 16 - PANELBOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Lighting and appliance panelboards.
- B. Overcurrent protective devices for panelboards.

1.2 RELATED REQUIREMENTS

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 407 - Standard for Installing and Maintaining Panelboards; 2015.
- C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- D. NEMA PB 1 - Panelboards; 2011.
- E. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 1000V or Less; 2023.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 67 - Panelboards; Current Edition, Including All Revisions.
- J. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

- A. **Product Data:** Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
- B. **Shop Drawings:** Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
- C. **Maintenance Materials:** Furnish the following for Owner's use in maintenance of project.
 1. **Panelboard Keys:** Two of each different key.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.8 FIELD CONDITIONS

- A. Maintain ambient temperature within the following limits during and after installation of panelboards:
 1. **Panelboards Containing Circuit Breakers:** Between 23 degrees F and 104 degrees F.

PART 2 PRODUCTS

2.1 MANUFACTURERS but not limited to.

- A. ABB/GE; _____: www.geindustrial.com/#sle.
- B. Eaton Corporation: www.eaton.com/#sle.

- C. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
- D. Siemens Industry, Inc: www.usa.siemens.com/#sle.

2.2 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:
 - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 - 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
 - 2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- G. Conductor Terminations: Suitable for use with the conductors to be installed.
- H. Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 - 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

2.3 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 2. Phase and Neutral Bus Material: Aluminum.
 3. Ground Bus Material: Aluminum.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
 1. Provide surface-mounted enclosures as indicated.
 2. Provide clear plastic circuit directory holder mounted on inside of door.

2.4 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 3. Conductor Terminations:
 - a. Provide mechanical lugs unless otherwise indicated.
 - b. Lug Material: Copper, suitable for terminating copper conductors only.
 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
 6. Do not use tandem circuit breakers.
 7. Do not use handle ties in lieu of multi-pole circuit breakers.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).

- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 05 29.
- F. Install panelboards plumb.
- G. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- H. Provide grounding and bonding in accordance with Section 26 05 26.
- I. Install all field-installed branch devices, components, and accessories.
- J. Provide filler plates to cover unused spaces in panelboards.

3.3 FIELD QUALITY CONTROL

- A. Test shunt trips to verify proper operation.
- B. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.4 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.
- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.5 CLEANING

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 24 16

SECTION 26 27 26 - WIRING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Wall plates.

1.2 RELATED REQUIREMENTS

- A. Section 26 05 33.16 - Boxes for Electrical Systems.
- B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h (Validated 2022).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2017g (Validated 2023).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interruption; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.

3. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
4. Notify engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.5 SUBMITTALS

- A. **Product Data:** Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. **Products:** Listed, classified, and labeled as suitable for the purpose intended.

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.1 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide tamper resistant receptacles.

2.2 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. **Wiring Devices, Unless Otherwise Indicated:** Ivory with white nylon wall plate.

2.3 WALL SWITCHES

- A. **Manufacturers but not limited to:**
 1. Hubbell Incorporated; _____: www.hubbell.com/#sle.
 2. Leviton Manufacturing Company, Inc; _____: www.leviton.com/#sle.
 3. Pass & Seymour, a brand of Legrand North America, Inc; _____: www.legrand.us/#sle.
- B. **Wall Switches - General Requirements:** AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.

1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Standard Wall Switches: Commercial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw as indicated on the drawings.

2.4 RECEPTACLES

- A. Manufacturers but not limited to:
1. Hubbell Incorporated; _____: www.hubbell.com/#sle.
 2. Leviton Manufacturing Company, Inc; _____: www.leviton.com/#sle.
 3. Pass & Seymour, a brand of Legrand North America, Inc; _____: www.legrand.us/#sle.
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
1. Tamper Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated.
- D. GFCI Receptacles:
1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - a. Provide test and reset buttons of same color as device.
 2. Standard GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.

2.5 WALL PLATES

- A. Wall Plates: Comply with UL 514D.
1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 2. Size: Standard; _____.
 3. Screws: Metal with slotted heads finished to match wall plate finish.
- B. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of wiring devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches above finished floor.
 - b. Receptacles: 18 inches above finished floor or 6 inches above counter.
 - 2. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Unless otherwise indicated, GFCI receptacles may be connected to provide feed-through protection to downstream devices. Label such devices to indicate they are protected by upstream GFCI protection.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.
- K. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

- L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.4 FIELD QUALITY CONTROL

- A. Inspect each wiring device for damage and defects.
- B. Operate each wall switch with circuit energized to verify proper operation.
- C. Test each receptacle to verify operation and proper polarity.
- D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- E. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.5 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.6 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION 26 27 26

SECTION 26 36 00 - TRANSFER SWITCHES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Transfer switches for low-voltage (600 V and less) applications and associated accessories:
 - 1. Manual transfer switches.
 - 2. Includes service entrance rated transfer switches.

1.2 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- C. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- D. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
 - 1. Includes requirements for the seismic qualification of equipment specified in this section.
- E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 05 73 - Power System Studies: Additional criteria for the selection of equipment specified in this section.

1.3 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- C. NEMA ICS 10 Part 1 - Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment; 2020.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.
- F. UL 1008 - Transfer Switch Equipment; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 2. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Coordinate the work with placement of supports, anchors, etc. required for mounting.
4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features.
- B. Manufacturer's equipment seismic qualification certification.

1.6 QUALITY ASSURANCE

- A. Comply with the following:
 1. NFPA 70 (National Electrical Code).

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store transfer switches in accordance with manufacturer's instructions.
- B. Handle carefully in accordance with manufacturer's instructions to avoid damage to transfer switch components, enclosure, and finish.

PART 2 PRODUCTS

2.1 TRANSFER SWITCHES

- A. Provide complete power transfer system consisting of all required equipment, conduit, boxes, wiring, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Construction Type: Either "contactor type" (open contact) or "breaker type" (enclosed contact) transfer switches complying with specified requirements are acceptable.
- D. Manual Transfer Switch:
 1. Transfer Switch Type: As indicated on the drawings.
 2. Transition Configuration: As indicated on the drawings.
 3. Voltage: As indicated on the drawings.
 4. Ampere Rating: As indicated on the drawings.
 5. Neutral Configuration: Switched neutral.
 6. Load Served: As indicated on the drawings.
 7. Primary Source: As indicated on the drawings.
 8. Alternate Source: As indicated on the drawings.
- E. Comply with NEMA ICS 10 Part 1, and list and label as complying with UL 1008 for the classification of the intended application (e.g. emergency, optional standby).

- F. Do not use double throw safety switches or other equipment not specifically designed for power transfer applications and listed as transfer switch equipment.
- G. Load Classification: Classified for total system load (any combination of motor, electric discharge lamp, resistive, and tungsten lamp loads with tungsten lamp loads not exceeding 30 percent of the continuous current rating) unless otherwise indicated or required.
- H. Switching Methods:
 - 1. Open Transition:
 - a. Provide break-before-make transfer without a neutral position that is not connected to either source, and with interlocks to prevent simultaneous connection of the load to both sources.
 - 2. Obtain control power for transfer operation from line side of source to which the load is to be transferred.
- I. Seismic Qualification: Provide transfer switches and associated components suitable for application under the seismic design criteria specified in Section 26 05 48 where required. Include certification of compliance with submittals.
- J. Service Conditions: Provide transfer switches suitable for continuous operation at indicated ratings under the service conditions at the installed location.
- K. Enclosures:
 - 1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Outdoor Locations: Type 3R or Type 4.
 - 2. Provide lockable door(s) for outdoor locations.
 - 3. Finish: Manufacturer's standard unless otherwise indicated.
- L. Short Circuit Current Rating:
 - 1. Withstand and Closing Rating: Provide transfer switches, when protected by the supply side overcurrent protective devices to be installed, with listed withstand and closing rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 26 05 73.
- M. Manual Transfer Switches:
 - 1. Description: Transfer switches with manually initiated transfer between sources; electrically operated and mechanically held.
- N. Service Entrance Rated Transfer Switches:
 - 1. Furnished with integral disconnecting and overcurrent protective device on the primary/normal source and with ground-fault protection where indicated.
 - 2. Listed and labeled as suitable for use as service equipment according to UL 869A.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that the ratings and configurations of transfer switches are consistent with the indicated requirements.
- B. Verify that rough-ins for field connections are in the proper locations.

- C. Verify that mounting surfaces are ready to receive transfer switches.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install transfer switches plumb and level.
- F. Unless otherwise indicated, mount floor-mounted transfer switches on properly sized 3 inch high concrete pad constructed in accordance with Section 03 30 00.
- G. Provide grounding and bonding in accordance with Section 26 05 26.
- H. Identify transfer switches and associated system wiring in accordance with Section 26 05 53.

3.3 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION 26 36 00

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior luminaires.
- B. Exit signs.

1.2 RELATED REQUIREMENTS

- A. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- B. Section 26 05 33.16 - Boxes for Electrical Systems.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 09 23 - Lighting Control Devices: Automatic controls for lighting including occupancy sensors, outdoor motion sensors, and time switches.
- E. Section 26 27 26 - Wiring Devices: Manual wall switches and wall dimmers.

1.3 REFERENCE STANDARDS

- A. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
- B. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems; 2006.
- E. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- I. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- J. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.5 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.8 WARRANTY

- A. Provide five year manufacturer warranty for LED luminaires, including drivers.

PART 2 PRODUCTS

2.1 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.2 LUMINAIRES

- A. Manufacturers:
 - 1. Acuity Brands, Inc: www.acuitybrands.com/#sle.

2. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com/#sle.
 3. Hubbell Lighting, Inc: www.hubbellighting.com/#sle.
 4. Philips Lighting North America Corporation; _____;
www.lightingproducts.philips.com/#sle.
- B. Provide products that comply with requirements of NFPA 70.
- C. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- H. LED Luminaires:
1. Components: UL 8750 recognized or listed as applicable.
 2. Tested in accordance with IES LM-79 and IES LM-80.
 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.3 EXIT SIGNS

- A. Manufacturers - Powered and Self-Luminous Signs:
1. Acuity Brands, Inc; _____: www.acuitybrands.com/#sle.
 2. Cooper Lighting, a division of Cooper Industries; _____: www.cooperindustries.com/#sle.
 3. Hubbell Lighting, Inc; _____: www.hubbellighting.com/#sle.
 4. Philips Lighting North America Corporation; _____;
www.lightingproducts.philips.com/#sle.
- B. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
1. Number of Faces: Single or double as indicated or as required for the installed location.
 2. Directional Arrows: As indicated or as required for the installed location.
- C. Self-Powered Exit Signs:
1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
 2. Battery: Sealed maintenance-free nickel cadmium unless otherwise indicated.
 3. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
 4. Provide low-voltage disconnect to prevent battery damage from deep discharge.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install products in accordance with manufacturer's instructions.
- D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- E. Provide required support and attachment in accordance with Section 26 05 29.
- F. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- G. Suspended Ceiling Mounted Luminaires:
 - 1. Do not use ceiling tiles to bear weight of luminaires.
 - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
 - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
 - 4. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
 - 5. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.
 - 6. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- H. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

- I. Install accessories furnished with each luminaire.
- J. Bond products and metal accessories to branch circuit equipment grounding conductor.
- K. Exit Signs:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

3.4 FIELD QUALITY CONTROL

- A. Inspect each product for damage and defects.
- B. Operate each luminaire after installation and connection to verify proper operation.
- C. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.5 ADJUSTING

- A. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by authority having jurisdiction.
- B. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by engineer or authority having jurisdiction.

3.6 CLEANING

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

END OF SECTION 26 51 00

SECTION 26 56 00 - EXTERIOR LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Exterior luminaires.

1.2 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- C. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- D. Section 26 05 33.16 - Boxes for Electrical Systems.

1.3 REFERENCE STANDARDS

- A. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2006.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 1598 - Luminaires; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.

1.5 SUBMITTALS

- A. Shop Drawings:
 - 1. Provide photometric calculations where luminaires are proposed for substitution upon request.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.7 WARRANTY

- A. Provide five year manufacturer warranty for all LED luminaires, including drivers.

PART 2 PRODUCTS

2.1 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.2 LUMINAIRES

- A. Manufacturers not limited to:
 1. Acuity Brands, Inc; _____: www.acuitybrands.com/#sle.
 2. Cooper Lighting, a division of Cooper Industries; _____: www.cooperindustries.com/#sle.
 3. Hubbell Lighting, Inc; _____: www.hubbellighting.com/#sle.
 4. Philips Lighting North America Corporation; _____; www.lightingproducts.philips.com/#sle.
- B. Provide products that comply with requirements of NFPA 70.
- C. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Pole-Mounted Luminaires:
 - 1. Foundation-Mounted Poles:
 - a. Provide cast-in-place concrete foundations for poles as indicated, in accordance with Section 03 30 00.
 - 1) Install anchor bolts plumb per template furnished by pole manufacturer.
 - 2) Position conduits to enter pole shaft.
 - b. Install foundations plumb.
 - c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
 - d. Tighten anchor bolt nuts to manufacturer's recommended torque.
 - 2. Grounding:
 - a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
 - 3. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.
- G. Install accessories furnished with each luminaire.
- H. Bond products and metal accessories to branch circuit equipment grounding conductor.

- I. Install lamps in each luminaire.

3.4 FIELD QUALITY CONTROL

- A. Inspect each product for damage and defects.
- B. Operate each luminaire after installation and connection to verify proper operation.
- C. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.5 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by engineer. Secure locking fittings in place.
- B. Luminaires with Field-Rotatable Optics: Position optics according to manufacturer's instructions to achieve lighting distribution as indicated or as directed by engineer.

3.6 CLEANING

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.7 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

END OF SECTION 26 56 00

SECTION 28 46 00 - FIRE DETECTION AND ALARM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fire alarm system design and installation, including all components, wiring, and conduit.
- B. Maintenance of fire alarm system under contract for specified warranty period.

1.2 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 - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 72 - National Fire Alarm and Signaling Code; Most Recent Edition Cited by Referring Code or Reference Standard.
- F. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.3 SUBMITTALS

- A. Evidence of designer qualifications.
- B. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams sealed by a professional engineering of the state of missouri.
 - 1. Copy (if any) of list of data required by authority having jurisdiction.
 - 2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
 - 3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
 - 4. System zone boundaries and interfaces to fire safety systems.
 - 5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
 - 6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
 - 7. List of all devices on each signaling line circuit, with spare capacity indicated.
 - 8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.

9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
 10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
 11. Certification by the manufacturer of the control unit that the system design complies with Contract Documents.
 12. Certification by Contractor that the system design complies with Contract Documents.
- C. Evidence of installer qualifications.
- D. Evidence of maintenance contractor qualifications, if different from installer.
- E. Inspection and Test Reports:
1. Submit inspection and test plan prior to closeout demonstration.
 2. Submit documentation of satisfactory inspections and tests.
 3. Submit NFPA 72 "Inspection and Test Form," filled out.
- F. Project Record Documents:
1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
 2. "As installed" wiring and schematic diagrams, with final terminal identifications.
 3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.
- G. Closeout Documents:
1. Certification by manufacturer that the system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.
 2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.
 3. Certificate of Occupancy.
 4. Maintenance contract.

1.4 QUALITY ASSURANCE

- A. Designer Qualifications: Registered professional engineer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.
- B. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
 2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
 3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.
- C. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.

1.5 WARRANTY

- A. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 1 year after date of Substantial Completion.
- B. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Fire Alarm Control Units and Accessories - Basis of Design: Honeywell Security & Fire Solutions / Gamewell -FCI.
- B. Initiating Devices and Notification Appliances:
 - 1. Honeywell Security & Fire Solutions/Gamewell-FCI: www.gamewell-fci.com/#sle.

2.2 FIRE ALARM SYSTEM

- A. Fire Alarm System: Provide a new automatic fire detection and alarm system:
 - 1. Provide all components necessary, regardless of whether shown in Contract Documents or not.
 - 2. Protected Premises: Entire building shown on drawings.
 - 3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
 - a. ADA Standards.
 - b. The requirements of the local authority having jurisdiction .
 - c. Applicable local codes.
 - d. Contract Documents (drawings and specifications).
 - e. NFPA 101.
 - f. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
 - 4. Evacuation Alarm: Multiple smoke zones; allow for evacuation notification of any individual zone or combination of zones, in addition to general evacuation of entire premises.
 - 5. General Evacuation Zones: Each smoke zone is considered a general evacuation zone unless otherwise indicated, with alarm notification in all zones on the same floor, on the floor above, and the floor below.
- B. Supervising Stations and Fire Department Connections:
 - 1. Public Fire Department Notification: By on-premises supervising station.
- C. Circuits:
 - 1. Initiating Device Circuits (IDC): Class B, Style A.
 - 2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 0.5.
 - 3. Notification Appliance Circuits (NAC): Class B, Style W.
- D. Power Sources:
 - 1. Primary: Dedicated branch circuits of the facility power distribution system.
 - 2. Secondary: Storage batteries.

3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.
4. Each Computer System: Provide uninterruptible power supply (UPS).

2.3 FIRE SAFETY SYSTEMS INTERFACES

- A. Supervision: Provide supervisory signals in accordance with NFPA 72 for the following:
 1. Sprinkler water control valves.
- B. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
 1. Sprinkler water flow.
- C. HVAC:
 1. Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.

2.4 COMPONENTS

- A. General:
 1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
 2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
- B. Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.
- C. Initiating Devices:
 1. Addressable Systems:
 - a. Addressable Devices: Individually identifiable by addressable fire alarm control unit.
 - b. Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.
- D. Circuit Conductors: Copper or optical fiber; provide 200 feet extra; color code and label.
- E. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
- F. Locks and Keys: Deliver keys to Owner.
- G. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
 1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
 2. Provide one for each control unit where operations are to be performed.
 3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
 4. Provide extra copy with operation and maintenance data submittal.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.

- B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.
- C. Obtain Owner's approval of locations of devices, before installation.
- D. Install instruction cards and labels.

3.2 INSPECTION AND TESTING FOR COMPLETION

- A. Notify Owner 7 days prior to beginning completion inspections and tests.
- B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- E. Provide all tools, software, and supplies required to accomplish inspection and testing.
- F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- G. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.3 CLOSEOUT

- A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
 - 1. Be prepared to conduct any of the required tests.
 - 2. Have at least one copy of operation and maintenance data, copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
 - 3. Have authorized technical representative of control unit manufacturer present during demonstration.
 - 4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
 - 5. Repeat demonstration until successful.
- B. Substantial Completion of the project cannot be achieved until inspection and testing is successful and:
 - 1. Approved operating and maintenance data has been delivered.
 - 2. All aspects of operation have been demonstrated to Owner.
 - 3. Final acceptance of the fire alarm system has been given by authorities having jurisdiction.
 - 4. Occupancy permit has been granted.

3.4 MAINTENANCE

- A. Provide to Owner, at no extra cost, a written maintenance contract for entire manufacturer's warranty period, to include the work described below.
- B. Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
 - 1. Maintenance of fire safety interface and supervisory devices connected to fire alarm system.

2. Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
 3. Record keeping required by NFPA 72 and authorities having jurisdiction.
- C. Provide trouble call-back service upon notification by Owner:
1. Provide on-site response within 2 hours of notification.
 2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
 3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.
- D. Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.
- E. Maintain a log at each fire alarm control unit, listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.
- F. Comply with Owner's requirements for access to facility and security.

END OF SECTION 28 46 00

**SECTION 31 1000
SITE CLEARING**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, include General and Supplementary Conditions, apply to this Section.
- B. Storm Water Pollution Prevention Plan (SWPPP) dated September 2024 and prepared by Crockett Engineering Consultants.

1.2 SUMMARY

- A. Section includes:
 - a. Protecting existing vegetation to remain.
 - b. Removing existing vegetation.
 - c. Clearing and grubbing.
 - d. Stripping and stockpiling topsoil.
 - e. Removing above and below grade site improvements shown to be removed.
 - f. Disconnecting, capping or sealing, and removing site utilities.
 - g. Temporary erosion and sedimentation control.
- B. Related Requirements:
 - a. Current City municipality Land Disturbance Permit requirements.
 - b. Current State Department of Natural Resources Land Disturbance Permit requirements.

1.3 DEFINITIONS

- A. BMPs: The term Best Management Practices is used to describe the controls and activities used to prevent stormwater pollution.
- B. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than one percent organic matter and few soil organisms.
- C. Topsoil: Top layer of the soil profile usually richest in organic matter and nutrients consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay, lumps, gravel, and other objects larger than 2 inches in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials. A pH range of 5.0-7.5 is acceptable.
- D. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.

- E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

- A. Except for materials indicated to be stockpiled or otherwise remain on Owner's property, manmade cleared materials shall become Contractor's property and shall be removed from the project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 - 1. Erosion control blankets / turf reinforcement mats.
 - 2. Sediment fencing.

1.6 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - a. Use sufficiently detailed photographs or video recordings.
 - b. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designed to remain.
- B. Record Drawings: Identify and accurately showing location of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.7 FIELD CONDITIONS

- A. Traffic; Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site clearing operations.
 - 1. Do not close or obstruct streets, walks or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 - 1. Do not proceed with work on adjoining property until directed by the Owner.
- C. Utility Locator Service: Notify "One Call" for area where project is located and obtain and verify all existing utility locations before starting project.
- D. Do not commence site clearing operations until temporary erosion and sediment control and tree protection measures are in place.
- E. Tree-Protection Zones: Protect according to requirements in project plans.
- F. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 2000 "Earth Moving."

PART 3 – EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction. The owner will provide three survey control points for Contractor use.
- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in the project plans.
- C. Protect existing site improvements to remain from damage during construction.
 - a. Restore damaged improvements to their original condition, as acceptable to the Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sediment control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion and sediment control drawings and requirements of the authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activities do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion control and sediment control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sediment controls, and restore and stabilize areas disturbed during removal.
- E. Completely fill out all aspects of SWPPP prior to any site disturbing activities.
- F. Adhere to all aspects of erosion and sediment control as indicated in the project SWPPP, Plans, and any required site disturbance permits.
- G. Obtain any and all required permits prior to any site disturbing activities.

3.3 TREE AND PLANT PROTECTION

- A. Protect trees and plants remaining on-site according to requirements in project plans.
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations.

3.4 EXISTING UTILITIES

- A. Arrange for disconnecting and sealing utilities that serve existing structures before site clearing.
 - a. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Interrupting Existing Utilities: Do not interrupt utilities serving offsite facilities.
- C. Excavate for and remove underground utilities indicated to be removed.
- D. Removal of underground utilities is included in earthwork sections.

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - a. Do not remove trees, shrubs, and other vegetation indicated to remain or to be protected.
 - b. Excavate to remove the entire root ball for woody vegetation.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - a. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.
 - b. Finish grade all areas to provide positive drainage.
- C. Burning: No burning allowed on-site.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to a depth of 6 inches or as encountered in the field in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - a. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to protect windblown dust and erosion by water.
 - a. Limit height of topsoil stockpile to 72 inches.
 - b. Do not stockpile topsoil within protection zones.
 - c. Adhere to all current city municipality stockpile requirements.

3.7 SITE IMPROVEMENTS

- A. Remove existing above and below ground improvements as indicated to facilitate new construction.
- B. Remove all slabs, paving, curbs, gutters, foundations, and aggregate bases shown to be removed.
- C. Remove all utilities, both underground and above ground, shown to be removed on the civil drawings.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove all demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 1000

**SECTION 31 2000
EARTH MOVING**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - a. Excavating and filling for rough grading the Site.
 - b. Preparing subgrades for slab-on-grade, walks, pavements, turf and grasses, and plants.
 - c. Excavating and backfilling for buildings and structures.
 - d. Drainage course for concrete slabs-on-grade.
 - e. Subbase course for concrete walks, and pavements.
 - f. Subbase course and base course for asphalt paving.
 - g. Subsurface drainage backfill for walls and trenches.
 - h. Excavation and backfilling trenches for utilities and pits for buried utility structures.
- B. Related Requirements:
 - a. Section 311000 “Site Clearing” for site stripping, grubbing, stripping, and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
 - b. Section 329200 “Turf and Grasses” for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.

1.3 UNIT PRICES

- A. Rock Measurement: volume of rock, actually removed, measured in original position, but not to exceed the following. Unit prices for rock excavation include replacement with approved materials.
 - 1. 24 inches (600 mm) outside of concrete forms other than at footings.
 - 2. 12 inches (300 mm) outside of concrete forms at footings.
 - 3. 6 inches (150 mm) outside of minimum required dimensions of concrete cast against grade.
 - 4. 6 inches beneath bottom of concrete slabs-on-grade.
 - 5. 6 inches (150 mm) beneath pipe in trenches, and 24 inches (600 mm) wider than pipe, unless otherwise noted on the drawings.
- B. Contractor shall provide the Owner a unit cost per cubic yard for trench rock excavation, prior to construction taking place at the site.
- C. Unsuitable Soils: The contractor shall provide the Owner a unit cost per cubic yard for mass removal and replacement of unsuitable soils. The price shall include costs to remove and haul off unsuitable materials and import and compact suitable replacement material.

1.4 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Course: Satisfactory soil imported from off – site use as fill or backfill.
- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to line and dimensions indicated.
1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Owner. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Owner. Unauthorized excavation, as well as remedial work directed by Owner, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material $\frac{3}{4}$ cu. Yard (0.57 cu. m) or more in volume.
- I. Structures; Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above to below the ground surface.
- J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement or aggregate layer placed between the subgrade and a cement concrete pavement or hot-mix asphalt walk.
- K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or back fill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- L. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.5 SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
1. Warning tapes.
 2. Vapor Barrier.
- B. Samples for Verification: For the following products, in sizes indicated below:
1. Warning Tape: 12 inches (300 mm) long; of each color.
 2. Vapor Barrier: 12 inches by 12 inches.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: for qualified testing agency.
- B. Material Test Reports: For each on-site and borrow soil material for proposed fill and backfill as follows:
 - a. Classification according to ASTM D 2487
 - b. Laboratory compaction curve according to ASTM D 698.
- C. Pre-excavation photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surface that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.7 FIELD CONDITIONS

- A. Traffic; Minimize interference with adjoining roads, streets, walks, and other adjacent occupied of used facilities during earth-moving operations.
 - 1. Do not close or obstruct streets, walks or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 - 1. Do not proceed with work on adjoining property until directed by the Owner.
- C. Utility locator Service: Notify "Missouri One Call" for area where Project is located before beginning earth-moving operations.
- D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation- control measures indicated in civil plans are in place.
- E. Do not commence earth- moving operations until tree protection measures indicated in civil plans are in place.

1.8 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from extensions.
- B. Satisfactory Soils: Soils Classification Groups GW, GM, GC, SW, SP, SM, SC and CL according to ASTM D 2487 or a combination of these groups; free of rock or gravel larger than 8 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. Soils that classify as CH should be analyzed and approved by a qualified geotechnical engineer prior to use.
- C. Unsatisfactory Soils: Soil Classification Groups OL, MH, OH, and PT according to ASRM D 2487 or a combination of these groups.
 - a. Unsatisfactory soils also include satisfactory soils not maintained within -2 to +4 percent of optimum moisture content at time of compaction.

- D. Subbase Material: Subbase material shall meet the crushed stone base State Department of Transportation requirements of Section 1007 of the current Missouri Standards for Highway Construction, Type 1.
- E. Engineered Fill: Controlled and compacted soil fill placed in accordance with ASTM D698.
- F. Bedding Course: Per ASTM C33 #67 or approved equal.
- G. Drainage Course: Rock course meeting the gradation requirements for a #67 rock as defined by ASTM C 33.

1.9 ACCESSORIES

- A. Detectable warning tape: Acid and Alkali resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with the description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried 30 inches deep; colored as follows
 - a. Red: Electric
 - b. Yellow: Gas, Oil, steam, and dangerous materials
 - c. Orange: Telephone and other communications
 - d. Blue: Water systems
 - e. Green: Sewer systems

PART 2 – EXECUTION

2.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

2.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding project site and surrounding areas.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - a. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavation. Do not sure excavated trenches as temporary drainage ditches.

2.3 EXPLOSIVES

- A. Do not use explosives.

2.4 EXCAVATION, GENERAL

- A. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross-sectioned by the Design Team. The contract sum will be adjusted for rock excavation according to unit prices included in the contract documents. Changes in the contract time may be authorized for rock excavation.
 - a. Earth excavation includes excavating pavements and obstructions visible on the surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders and other materials not classified as rock or unauthorized excavation.
 - i. Intermittent drilling, ram hammering, or ripping of material not classified as rock excavation is earth excavation.
- B. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the dimensions indicated in the unit prices.

2.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus one inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - a. Excavations for footings and foundations; Do not disturb bottom excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 - b. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

2.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surface under walks and pavements to indicated lines, cross sections, elevations, and subgrades

2.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 - a. Beyond the building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipes or conduits. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise noted.
 - a. Clearance: 6 inches on each side of pipe or conduit, or as indicated on the drawings.
- C. Trench bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduits. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - a. Excavate trenches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

2.8 SUBGRADE INSPECTION

- A. Notify Owner when excavations have reached required subgrade.
- B. If Owner determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrade.
 - a. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph.
 - b. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Owner, and replace with compacted backfill or fill as direct.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Owner, without additional compensation.

2.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by the Owner.
 - a. Fill unauthorized excavations under other construction, pipe, or conduit as directed by the Owner.

2.10 UNAUTHORIZED EXCAVATION

- A. Stockpile borrow soil materials and excavated satisfactory soil material without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - a. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

2.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - a. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
 - b. Surveying locations of underground utilities for Record Documents.
 - c. Testing and inspecting underground utilities.
 - d. Removing concrete formwork.
 - e. Removing trash and debris.
 - f. Removing temporary shoring, bracing, and sheeting.
 - g. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow or ice.

2.12 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of much, frost, snow or ice.

- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings with lean concrete fill, with 28-day compressive strength of 2500 psi.
- D. Trenches under Roadways: Place and compact backfill for Engineered Fill material to bottom of the roadway pavement and a minimum of 1 foot beyond edge of pavement in all directions. Place and compact in 8 inch maximum lifts.
- E. Backfill voids with satisfactory soil while removing shoring and bracing.
- F. Place and compact initial backfill of Engineered Fill, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- G. Final Backfill (if not specifically indicated in civil plans):
 - a. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
- H. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

2.13 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical unit to 5 horizontal units so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - a. Under grass and planted areas, use satisfactory soil material.
 - b. Under walks and pavements, use satisfactory soil material.
 - c. Under steps and ramps, use satisfactory soil material.
 - d. Under building slabs, use satisfactory soil material.
 - e. Under footings and foundations, use satisfactory soil material.
 - f. Under grass and planted areas, use satisfactory soil material to achieve grades to bottom of topsoil layer. Achieve finished grade by placing a topsoil layer to thickness indicated in the civil plans.
 - i. Topsoil shall be obtained from the on-site topsoil pile created with the initial grading operations.
 - g. Place soil fill on subgrade free of mud, frost, snow, or ice.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

2.14 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within -2% to +4% of optimum moisture content.
 - a. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

- b. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by +4 percent and is too wet to compact to specified dry unit weight.

2.15 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers
- B. Place backfill and fill soil materials on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
 - a. Under building slabs, compact each layer of backfill or fill soil material at least 95 percent.
 - b. Under walkways, structures, steps, and pavements, compact each layer of backfill or fill soil material at least 95 percent.
 - c. Under turf or unpaved areas, compact each layer of backfill or fill soil material at least 95 percent to achieve bottom of topsoil layer elevation. Topsoil surface material shall not exceed 80-85 percent compaction. Light compaction only. Do not allow vehicular access within topsoil areas after placement. Excessively hardened, compacted, or tight topsoil will be rejected and is to be replaced by the Contractor at no cost to the Owner.
 - d. For utility trenches, compact each layer of initial and final backfill soil material at least 95 percent.

2.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - a. Provide a smooth transition between adjacent existing grades and new grades.
 - b. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevation, within the following subgrade tolerances:
 - a. Turf or Unpaved Areas: Plus or minus 1 inch.
 - b. Athletic Field Areas: Plus or minus 1/4 inch.
 - c. Walks: Plus or minus 1/2 inch.
 - d. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.
- D. Within Athletic Fields:
 - a. Final subgrade preparation receiving topsoil shall be done with equipment that does not leave indentations deeper than 1/2 inch. Typical wheeled road grading equipment is prohibited. Equipment with flotation turf tires, or lightweight designs specific for turf preparation/maintenance are acceptable.

2.17 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place on subbase course on subgrades free of mud, frost, snow or ice.

- B. On prepared subgrade, place subbase course under pavements and walks as follows:
 - a. Shape subbase course to required crown elevations and cross-slope grades.
 - b. Place subbase course 6 inches or less in compacted thickness in a single layer.
 - c. Place subbase course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 - d. Compact subbase course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

2.18 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
 - a. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 - b. Place drainage course 6 inches or less in compacted thickness in a single layer.
 - c. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 - d. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

2.19 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work will comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by the Design Team.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:
 - a. Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2,500 square feet or less of paved area or building pad, but in no case fewer than three tests.
 - b. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 150 feet or less of wall length, but no fewer than two tests.
 - c. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.
 - d. Paved areas, sidewalks, Athletic fields, and other potential structural areas: At each compacted backfill layer, at least one test for every 10,000 square feet, but in no case fewer than three tests per lift.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

2.20 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - a. Scarify or remove and replace soil material to depth as directed by the Owner; reshape and recompact.
- C. Where settling occurs before project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - a. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

2.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove waste material, trash, and debris, and legally dispose of them off the Owner's property.

END OF SECTION 31 2000

**SECTION 31 2500
EROSION CONTROL**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Installation of temporary water pollution control measures to prevent discharge of pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage, or other harmful material from the project.
- B. Drawings and General Provisions of Contract, including General and Special Conditions, apply to this section.

1.2 GENERAL

- A. The Contractor shall manage his operations to control water pollution in accordance with this specification and applicable State regulations. Construction of permanent drainage facilities and other contract work, contributing to control of erosion, shall be scheduled at the earliest practicable time.
- B. The Contractor shall furnish, install, maintain and remove temporary erosion control measures. The Contractor shall prevent discharging silt or polluted storm water from the site.
- C. The Owner's Representative may require installation of additional erosion control facilities, by the Contractor, if in the sole opinion of the Owner's Representative the Contractor's efforts are adequate.

1.3 DEFINITIONS

- A. Temporary Berm: A temporary ridge of compacted soil, with or without a shallow ditch, constructed at the top of slopes or transverse to the centerline of a slope. The berm diverts storm runoff to temporary outlets to discharge water with minimal erosion.
- B. Temporary Seeding and Mulching: Placement of a quick ground cover to reduce erosion in areas expected to be re-disturbed.
- C. Straw Bales: Standard agricultural bales used to filter the flow of water trap, deposit sediment, and/or divert water.
- D. Silt Fence: A geotextile barrier fence to contain sediment by removing suspended particles from water passing through the fence.
- E. Sediment Removal: Removal of accumulated sediment to restore the efficiency of sediment control features.

1.4 SUBMITTALS

- A. The Contractor shall submit any coordinate any field modifications to the "Erosion Control Plan" for review and approval by the Owner's Representative. Approval of the plan changes does not relieve the Contractor of his contractual responsibility to prevent the discharge of pollutants into the receiving drainage ways.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Temporary Seeding
- B. Mulch shall be wheat straw.
- C. Wire Supported and Self Supporting Silt Fence:
 - 1. Geotextile Fabric
 - a. Fibers used in geotextiles shall consist of longchain synthetic polymers, composed of at least 85 percent by weight polyolefins, polyesters, or polyamides. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including selvages.
 - b. The geotextile shall be free of any treatment or coating which might adversely alter its physical properties after installation.
 - c. Geotextile shall be furnished in 36” width rolls.
 - d. Geotextile rolls shall be furnished with suitable wrapping for protection against moisture and extended ultraviolet exposure.
 - e. Each roll shall be labeled or tagged to provide product identification sufficient for inventory.
 - f. Rolls shall be stored in a manner, which protects them from the elements.
 - g. Geotextile shall conform to the following:

TABLE 1
PHYSICAL REQUIREMENTS FOR
TEMPORARY SILT FENCE GEOTEXTILES

Property	Test Method	Wire Fence Supported Requirements	Self Supported Requirements
Tensile Strength, Lbs.	ASTM D4632	90 Minimum	90 Minimum
Elongation at 50% Minim			
Tensile Strength (45 Lbs.)	ASTM D4632	N/A	50 Maximum
Filtering Efficiency, %	VTM-51	75	75
Flow Rate gal/ft/min	VTM-51	0.3	0.3
Ultraviolet Degradation at hrs.	ASTM D4355	Minimum 70% Strength Retained	Minimum 70% Strength Retained

- 1. Notes: All numerical values represent minimum average roll value. When tested in any principal direction. Virginia DOT test method.
 - h.
 - 2. Posts: Wood, steel, or synthetic post may be used. Posts shall have a minimum length of 36” plus embedment depth (24” min.). Posts shall have sufficient strength to resist damage during installation and to support applied loads.
 - 3. Support Fence: Wire or other support fence shall be at least 24” high and strong enough to support applied loads.

4. Prefabricated Fence: Prefabricated fence systems may be used provided they meet all of the above material requirements.

2.2 CLEANOUTS

- A. The Contractor shall furnish a manufacturer's certification, stating the material conforms to the requirements of these specifications.
- B. The certification shall include, or have attached, typical results of tests for the specified properties, representative of the materials supplied.
- C. The Owner's Representative reserves the right to sample and test any material offered for use.

PART 3 – EXECUTION

3.1 GENERAL REQUIREMENTS

- A. The Owner's Representative may limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, or fill operations.
- B. The Owner's Representative may direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams, other watercourses, lake, ponds, or other areas of water impoundment. Work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains, use of temporary mulches, seeding or other control devices or methods to control erosion.
- C. The Contractor shall incorporate permanent erosion control feature at the earliest practicable time.
- D. The Contractor at no additional cost shall provide temporary pollution control measures needed to control erosion during normal construction practices to the Owner.

3.2 LIMITATION OF AREA DISTURBED

- A. The Owner's Representative may limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, or fill operations.. The Contractor's operations shall be scheduled to install erosion control features immediately after clearing and grubbing.
- B. The Owner's Representative may limit the area of clearing and grubbing, excavation, borrow, and embankment operations commensurate with the Contractor's capability and progress in completing the finish grading, mulching seeding,
- C. The Contractor shall respond to seasonal variations. If required by weather, temporary erosion control measures shall be taken immediately.

3.3 BORROW AND WASTE AREAS

- A. Material pits other than commercially operated sources and material spoil areas shall be subject to pollution control measures of this specification. An offsite location does not relieve the Contractor of his contractual obligation to prevent the introduction of silt or other pollutants into receiving waterways.

3.4 CONFLICT WITH FEDERAL, STATE OR LOCAL LAWS, RULES OR REGULATIONS

- A. In case of conflict between these requirements and pollution control laws, rules, or regulations or other Federal, State or local agencies, the more restrictive laws, rules, or regulations shall apply.

3.5 TEMPORARY BERMS

- A. Temporary berms shall be constructed at the top of newly constructed slopes and/or transverse to grade to divert runoff and prevent erosion until permanent controls are installed and/or slopes are stabilized.
- B. Construction Requirements:
 - i. Berms shall be constructed to the approximate dimensions indicated on the drawings. Berms shall be machine compacted with a minimum of one pass over the entire width with a bulldozer tread, grader wheel, or other approved method.
 - ii. Berms must drain to a compacted outlet at a slope drain. The top width of these berms may be wider and the side slopes flatter on transverse berms to allow equipment to pass over these berms with a minimal disruption.

3.6 TEMPORARY SEEDING AND MULCHING

- A. General
 - 1. This item is applicable to all projects.
 - 2. Seeding and/or mulching shall be a continuous operation on all cut slopes, fill slopes, and borrow pits during the construction process. All disturbed areas shall be seeded and mulched within five (5) working days after the last construction activity in all locations where necessary to eliminate erosion.
- B. Construction Requirements:
 - 1. Permanent seeding and mulching following temporary seeding will be performed during the favorable seeding seasons only.
 - 2. Temporary seeding mixtures and planting season:
 - a. Refer to local code based off of landscaping zoning.
 - 3. Temporary mulch, fertilizer, and lime for seeding:
 - 4. Fertilizer and mulch for temporary seed mixtures shall be commercial type applied at the rate specified by the manufacturer.
 - 5. Lime will not be required.

3.7 STRAW BALES

- A. General
 - 1. Install at the bottom of embankment slopes less than 10' high to divert runoff from sheet flow and intercept some of the sediment in the sheet flow.
 - 2. Install as ditch checks in small ditches and drainage areas.
 - 3. Install on the lower side of cleared areas to catch sediment from sheet flow.
- B. Construction Requirements:

1. Bales of straw shall be utilized to control erosion, trap sediment, and divert runoff.
2. Bales must be adequately braced from behind.

3.8 SILT FENCE

A. General

1. Install along the toe of fills over 10' in height, along the right-of-way line, parallel to drainageways or around an inlet to prevent sediment from entering the pipe system.

B. General Requirements:

1. The Contractor shall install a temporary silt fence in locations shown on the drawings, around inlets that accept flows containing silt, and other locations necessary to prevent the discharge of silt from the site.
2. Installation shall conform to the detail at the end of this section.
3. Fence construction shall be adequate to handle the stress from hydraulic and sediment loading.

C. Installation

1. Geotextile at the bottom of the fence shall be buried as indicated on the detail.
2. The trench shall backfilled and the soil compacted over the geotextile. The geotextile shall be spliced together as indicated on the detail.

D. Post Installation

1. Post spacing shall not exceed 8' for wire support fence installation or 5' for self-supported installations.
2. Posts shall be driven a minimum of 24" into the ground. Where rock is encountered, posts shall be installed in a manner approved by the Owner's Representative.
3. Closer spacing, greater embedment depth and/or wider posts shall be used in low areas, soft, or swampy ground to ensure adequate resistance to applied loads.
4. When support fence is used, the mesh shall be fastened securely to the upstream side of the post.
5. The mesh shall extend into the trench a minimum of 2" and extend a maximum of 36" above the original ground surface.
6. When self-supported fence is used, the geotextile shall be securely fastened to fence posts.

E. Maintenance

1. The Contractor shall maintain the integrity of silt fences as long as they are necessary to contain sediment runoff.
2. The Contractor shall inspect all temporary silt fences immediately after each rainfall. Inspect daily during prolonged rainfall.
3. The Contractor shall immediately correct deficiencies.
4. The Contractor shall make a daily review of the location of silt fences in areas where construction activities have changed the natural contour and drainage runoff to ensure that the silt fences are properly located for effectiveness.
5. Where a single fence is not adequate to handle the volume of silt or flows are not completely intercepted, additional silt fences shall be installed.
6. The Contractor shall remove and dispose of sediment deposits when the deposit approaches one-half the height of the fence.
7. The silt fence shall remain in place until the upstream surface is stabilized. Upon removal, the Contractor shall remove the silt fence, dispose of excess silt, and restore the disturbed area.

3.9 SEDIMENT REMOVAL

A. General

- B. Sediment deposits shall be removed when:
- C. The deposits reach approximately one-half the height of a ditch check, straw bale barrier or silt fence.
- D. The sediments have reduced the ponded volume of sediment basins to one-third of the original volume.
- E. Requested by the Owner's Representative.
- F. Sediment removed from erosion control features shall be deposited in a location where it will not erode into construction areas or watercourses.

END OF SECTION 31 2500

**SECTION 32 1216
ASPHALT PAVING**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Hot-mix asphalt paving.
 - 2. Asphalt surface treatments.

1.3 DEFINITION

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASDM D 8 for definition of terms.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
 - 1. Job-Mix Designs: For each job mix proposed for the work.
- B. Qualification Data: For qualified manufacturer and Installer.
- C. Material Certificates: For each paving material, from manufacturer.
- D. Material Test Reports: For each paving material.
- E. Wheel Stops: Manufacturer information including intended installation procedure.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the current MoDOT Standard Specifications for Highway Construction for asphalt paving work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location within temperature range requirements by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
 - a. Prime Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
 - b. Tack Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
 - c. Slurry Coat: Comply with weather limitations of ASTM D 3910.
 - d. Asphalt Base Course: Minimum surface temperature of 40 deg F (4.4 deg C) and rising at the time of placement.
 - e. Asphalt Surface Course: Minimum surface temperature of 60 deg F (15.6 deg C) at time of placement

PART 2 – PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Type 1 Aggregate: Per the MoDOT Standard Specifications for Highway Construction.

2.2 ASPHALT MATERIALS

- A. All asphalt material shall conform to the MoDOT Standard Specifications for Highway Construction.
- B. Water: Potable.

2.3 AUXILIARY MATERIALS

- A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.
- B. Sand: ASTM D 1073 or AASHTO M29, Grade Nos. 2 or 3.

2.4 MIXES

- A. Hot-Mix Asphalt: Per the current MoDOT Standard Specifications for Highway Construction.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excessive yielding. Do not proof-roll wet or saturated subgrades.
 - a. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph (5 km/h).
 - b. Proof roll with a pneumatic tired loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
 - c. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Owner, and replace with compacted backfill or fill as directed.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.
- D. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that the asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of asphalt surface.

3.2 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.20 gal./sqyd. Apply enough material to penetrate and seal but not flood surface. Allow prime coat time to cure.
 - a. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 - b. Protect primed substrate from damage until ready to receive paving.
- C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal/sqyd.
 - a. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - b. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.3 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - a. Place hot-mix asphalt base course per current MoDOT Standard Specifications for Highway Construction.
- B. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.4 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 - a. Clean contact surfaces and apply tack coat to joints.
 - b. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 - c. Offset transverse joints, in successive courses, a minimum of 24 inches.
 - d. Construct transverse joints at each point where the paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
 - e. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - f. Compact asphalt at joints to a density within 2 percent of specified course density.

3.5 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-place compactors in areas inaccessible to rollers.
 - a. Complete compaction before mix temperature cools to 185 deg F (85 deg C).
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - a. Minimum Asphaltic Course Density: At least 98 percent of reference laboratory density according to ASTM D 6927.
 - b. Minimum Bituminous Course Density: At least 95 percent of reference lab density according to ASTM D 6927.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - a. Base Course: Plus or minus 1/2 inch.
 - b. Surface Course: Plus or minus 1/4 inch.

- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straight edge applied transversely or longitudinally to paved areas:
 - a. Base Course: 1/4 inch
 - b. Surface Course: 1/8 inch
 - c. Crowned Surface: Test with crowned template centered and at right angles to the crown. Maximum allowable variance from template is 1/4".
- C. The paving tolerances noted above do not control in regards to site accessibility, and providing accessible routes in accordance with the American with Disabilities Act of 1990 and the 2010 ADA Standards for Accessible Design. Accessible routes shall meet the following:
 - a. Sidewalks shall not exceed 5 percent slope with a 2 percent cross-slope and shall be 5 feet wide except as noted on the civil plans.
 - b. Parking areas for accessible spaces and access isles shall not exceed 2% slope in any direction.
 - c. Ramps shall not exceed 8.33 percent with a 2 percent cross-slope and shall be 5' wide except as noted on site layout plan.
 - d. All sidewalk intersections shall have a 5 feet by 5 feet landing at 1/4" per one foot max slope in all direction.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field testing, frequency, and methods may vary as determined by and between the Owner and the Owner's Testing Agency.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. Asphaltic surface and base courses shall be randomly cored at a minimum rate of 1 core per 20,000 square feet of paving, but not less than 3 cores in light duty areas and 3 cores in heavy-duty areas shall be obtained. Asphaltic concrete pavement samples shall be tested for conformance with mix design.
- E. Immediately replace and compact hot-mix asphalt where core tests were taken.
- F. Thickness Test: Measure thickness of each core sample taken. The thickness of the course or the combined courses shall meet or exceed the indicated thickness. Where the deficiency exists, remove the affected pavement area and replace it with new pavement or, at discretion of the Owner, correct deficient paving thickness with tack coat and a minimum of a one inch overlay.
- G. Field Density test for in-place materials:
 - a. Density test shall be conducted on each core sample taken in accordance with ASTM D1188 or D2726 as applicable.
 - b. In-place density tests by nuclear method in accordance with ASTM D2950 shall also be taken as necessary to assure the specified density is obtained. Nuclear density shall be correlated with ASTM D1188 or D2726.
- H. Check all pavement for ponding areas and replace pavement as necessary to eliminate.
- I. Remove and replace unacceptable areas as directed by the Owner.

- J. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.8 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
 - a. Do not allow milled materials to accumulate on-site.

END OF SECTION 32 1216

SECTION 32 1313

CONCRETE PAVING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Driveways.
 - 2. Roadways.
 - 3. Parking lots.
 - 4. Curbs and Gutters.
 - 5. Walks.
 - 6. Track and field items.

1.3 DEFINITION

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Other Action Submittals:
 - a. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.
- D. Material Certificates: For the following, from manufacturer:
 - a. Cementitious materials.
 - b. Steel reinforcement and reinforcement accessories.
 - c. Welded wire fabric.
 - d. Admixtures.
 - e. Curing compounds.
 - f. Applied finish materials
 - g. Joint fillers
- E. Material Test Reports: For each of the following:
 - a. Aggregates

- F. Field quality-control reports.
- G. Submit certification that joint sealant has been installed in accordance with the manufacturer's instructions. Include a copy of written instructions.

1.5 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
 - a. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual –Section 3, "Plant Certification Checklist").
- B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - a. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- C. ACI Publications: Comply with ACI 301 unless otherwise indicated.

1.6 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities

PART 2 – PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - a. Use flexible or uniformly curved forms for curves with a radius of 100 feet (30.5 m) or less. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from galvanized steel wire into flat sheets.
- B. Joint Dowel Bars: ASTM A 615/ A 615M, Grade 60 (Grade 420) plain-steel bars. Cut bars true to length with ends square and free of burrs.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout the Project:
 - a. Portland Cement: ASTM C150, Type 1 or 2 Portland Cement.
- B. Normal Weight Aggregates: ASTM C33, uniformly graded. Provide aggregates from a single source.
 - a. Maximum Course Aggregate Size: 3/4 inch nominal.
 - b. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: Potable and complying with ASTM C 94 / C 94M
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - a. Water-Reducing Admixture: ASTM C494 / C494M, Type A.
 - b. Retarding Admixture: ASTM C494 / C494M, Type B.
 - c. Water-Reducing and Retarding Admixture: ASTM C494 / C494M, Type D.
 - d. High-Range, Water-Reducing Admixture: ASTM C494 / C494M, Type F.
 - e. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494 / C494M, Type G.
 - f. Plasticizing and Retarding Admixture: ASTM C 1017 / C1017M, Type 2.

2.4 CURING MATERIALS

- A. Absorptive Cover: AASHTO M182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sqyd. (305 g/sqm) dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterbourne, monomolecular, film forming, manufactured for application to fresh concrete.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - i. Axim Italcementi Group, Inc: Caltexol CIMFILM.
 - ii. BASF Construction Chemicals, LLC; Confilm.
 - iii. ChemMassters: Spray-Film.
 - iv. Conspec by Dayton Superior: Aquafilm.
 - v. Dayton Superior Corporation: Sure Film (J-74).
 - vi. Edoco by Dayton Superior; BurkeFilm.
 - vii. Euclid Chemical Company (The), an RPM company, EucoBar.
 - viii. Kaufman Products, Inc.: VaporAid,
 - ix. Lambert Corporation: LAMBCO Skin.
 - x. L&M Construction Chemicals, Inc.; E-CON.
 - xi. Meadows, W. R., Inc.; EVAPRE.
 - xii. Metalcrete Industries: Waterhold.
 - xiii. Nox-Crete Products Group; MONOFILM.
 - xiv. Sika Corporation, Inc.; SikaFilm.
 - xv. SpecChem, LLC.; SpecFilm.

- xvi. Symons by Dayton Superior; Finishing Aid.
 - xvii. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
 - xviii. Unitex; PRO-FILM.
 - xix. Vexcon Chemicals Inc.: Certi-Vex EnviroAssist.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.
- a. Available Products: Subject to compliance with requirements, available products that may be incorporated into the Work Include, but are not limited to, the following:
 - i. Anti-Hydro International, Inc.; A-H Curing Compound #2 DR WB.
 - ii. ChemMasters: Safe-Cure Clear.
 - iii. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
 - iv. Euclid Chemical Company (The), an RPM company; Kurez W VOX.
 - v. Kaufman Products, Inc.: Thinfilm 420.
 - vi. Lambert Corporation; AQUA KURE – CLEAR.
 - vii. L&M Construction Chemicals, Inc.; L&M CURE R.
 - viii. Meadows, R. W., Inc.; 1100-CLEAR SERIES.
 - ix. Nox-Crete Products Group; Resin Cure E.
 - x. SpecChem, LLC; PaveCure Rez.
 - xi. Symons by Dayton Superior; Resi-Chem Clear.
 - xii. Tamms Industries, Inc.; TAMMSCURE WB 30C.
 - xiii. Vexcon Chemicals Inc.; Certi-Vex Envirocure 100.

2.5 RELATED MATERIAL

- A. Joint Fillers: Resilient premolded bituminous impregnated fiberboard units complying with ASTM D994, D1751, D2628; FS HH-F-341, Type 2 Class A.
- B. Joint Sealants; ASTM C920, non-priming, pourable, self-leveling polyurethane.
- C. Water repellent and chloride screen; Prosoco Saltguard WB.

2.6 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - a. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
 - b. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
 - a. Compressive Strength (28 Days): 4000 psi.
 - b. Maximum Water-Cementitious Materials Ratio at point of placement: 0.45.
 - c. Slump Limit: 4 inches, plus or minus 1 inch.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having and air content as follows:
 - a. Air Content: 6 percent plus or minus 1.5 percent for ¾ inch nominal maximum aggregate size.
- D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

- a. Use plasticizing and retarding admixture in concrete as required for placement and workability.
 - b. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
- E. Cementitious Materials: Limit percentage by weight of cementitious materials other than Portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94. Furnish batch certificates for each batch discharged and used in the Work.
- a. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1.5 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. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excessive yielding.
- a. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.
 - b. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 - c. Correct subbase with soft spots and areas of pumping or rutting exceeding depths of 1/2 inch according to requirements in Division 31 Section “Earth Moving.”
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

- A. General: Form expansion, sawed or premolded strip, and keyed construction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - a. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Keyed Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - a. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 - b. Construct joints in accordance with details as shown in Plans.
- C. Expansion Joints: Locate expansion joints as shown and detailed in the Plans and as follows:
 - a. Locate expansion joints at intervals of 150 feet maximum each way unless otherwise indicated.
 - b. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed caps. Remove protective cap after concrete has been placed on both sides of joint.
- D. Sawed or Premolded Strip Joints: Provide a joint plan for approval by Owner. Joint spacing shall not exceed 15 feet maximum. Panels shall be cut such that panels are nearly square and do not exceed 1.4 length to width ratio.
 - a. Construct joints for depths equal to at least 1/3 of the concrete thickness.
 - b. Sawed Joints: Form joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8 inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/8 inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.
- F. Joint Fillers: Extend joint filler full-width and depth of joint, and not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated. Furnish joint filler in 1 piece lengths for full width being placed, wherever possible. Where more than 1 length is required, lace or clip joint filler sections together.
- G. Joint Sealants: Joints shall be sealed with approved exterior pavement joint sealants and shall be installed in accordance with manufacturer's recommendations.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation and items to be embedded or cast in.
- B. Remove snow, ice, or frost from subbase surface before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- F. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - a. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating dowels and joint devices.
- G. Screed paving surface with a straight edge and strike off.
- H. Commence initial floating using bull floats or darbies to impart and open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- I. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and joining.
- J. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
 - a. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.
- K. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - a. When the air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - b. Do not use frozen materials or materials containing snow and ice.
 - c. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- L. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
 - a. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control

- temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
- b. Fog-spray forms and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - a. Medium-to-Fine textured Broom Finish: Draw a soft-bristle broom across, float-finished concrete surface perpendicular to the line of traffic to provide a uniform, fine-line texture.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sqft per hour before and during finishing operations. Apply according to manufacturer's written instructions and after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by curing compound as follows:
 - a. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.
- F. Apply water repellent and chloride screen Prosoco Saltguard WB as directed by manufacturer and indicated in 321313 Appendix A to the following locations:
 - a. New sidewalks and accessible ramps.
 - b. New concrete landings, stairs, and patios at exterior doors.

3.9 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 - a. Elevation: 3/4 inch.
 - b. Thickness: Plus 3/8 inch, minus 1/4 inch.
 - c. Surface: Gap below 10-foot long, unlevelled straightedge not to exceed 1/2 inch.

- d. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
 - e. Lateral alignment and spacing of dowels: 1 inch
 - f. Vertical alignment of dowels: 1/4 inch
 - g. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
 - h. Joint Spacing: 3 inches
 - i. Contraction Joint Depth: Plus 1/4 inch, no minus.
 - j. Joint Width: Plus 1/8", no minus.
- B. The paving tolerances noted above do not control in regards to site accessibility, and providing accessible routes in accordance with the American Disabilities Act of 1990 and the 2010 ADA Standards for Accessible Design. Accessible routes shall meet the following:
- a. Sidewalks shall not exceed 5 percent slope with 2 percent cross-slope and shall be 5 feet wide except as noted on the civil plans.
 - b. Parking areas for accessible spaces and access isles shall not exceed 2 percent slope in any direction.
 - c. Ramps shall not exceed 8.33 percent slope with a 2 percent cross-slope and shall be 5 feet wide except as noted on the civil plans.
 - d. All sidewalk intersections shall have a 5'x5' landing with no more than 2 percent maximum slope in any direction.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C172 shall be performed according to the following requirements:
- a. Testing Frequency: Obtain at least one composite sample for each 50 cuyd or fraction thereof of each concrete mixture placed each day.
 - i. When frequency of testing will provide fewer than 5 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.
 - b. Slump: ASTM C143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - c. Air Content: ASTM C231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - d. Concrete Temperature: ASTM C1064; one test hourly when air temperatures is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
 - e. Compression Test Specimens: ASTM C31; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
 - f. Compressive Strength Tests: ASTM C; test one specimen at seven days; two specimens at 28 days and hold one specimen in reserve for future testing, if needed.
 - i. A compressive strength test shall be the average compressive strength from two specimens obtained from the same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if 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.

- D. Test results shall be reported in writing to the Owner, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project Identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7-day and 28-day tests.
- E. Nondestructive Testing: Sonoscope or other nondestructive device may be permitted by Owner but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by the Owner.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work within specified requirements.
- I. Prepare test and inspection reports.

3.11 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by the Owner.
- B. Drill test cores, where directed by the Owner, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from newly paved areas for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 1313

**SECTION 32 1373
CONCRETE PAVING JOINT SEALANTS**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - a. Cold-applied joint sealants.
- B. Related Sections:
 - a. Division 32 1313 Section “Concrete Paving” for constructing joints in concrete pavement.

1.3 SUBMITTALS

- A. Product Data: For each type of joint sealant product indicated.
- B. Pavement-Joint-Sealant Schedule: Include the following information:
 - a. Joint-sealant application, joint location, and designation.
 - b. Joint-sealant manufacturer and product name.
 - c. Joint-sealant formulation.
 - d. Joint-sealant color.
- C. Qualification Data: For qualified installer
- D. Product Certificates: For each type of joint sealant and accessory, from manufacturer.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for joint sealants.
- F. Preconstruction Compatibility and Adhesion Test Reports: From joint-sealant manufacturer, indicating the following:
 - a. Materials forming joint substrates and joint-sealant backings have been tested for compatibility with and adhesion to joint sealants.
 - b. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer’s authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each type of joint sealant from a single source from a single manufacturer.

1.5 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - a. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - b. When joint substrates are wet.
 - c. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - d. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrate.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

2.2 COLD-APPLIED JOINT SEALANTS

- A. Single-Component, Nonsag, Silicone Joint Sealant for Concrete: ASTM D 5893, Type NS.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work, include, but are not limited to, the following:
 - i. Crafco, Inc., and ERGON company, Road Saver Silicone.
 - ii. Dow Corning Corporation; 888.
 - iii. Pecora Corporation; 301 NS.
- B. Single-Component, Self-Leveling, Silicone Joint Sealant for Concrete: ASTM D 5893, Type SL.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work, include, but are not limited to, the following:
 - i. Crafco, Inc., and ERGON company, Road Saver Silicone SL.
 - ii. Dow Corning Corporation; 890-SL.
 - iii. Pecora Corporation; 301 SL.
- C. Multi-Component, Pourable, Traffic-Grade, Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 25, for Use T.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - i. Pecora Corporation; Urexpam NR-200
 - ii. Sikaflex®-2c SL
 - iii. Eucolastic Sealants: ASTM C 920

2.3 JOINT-SEALANT BACKER MATERIALS

- A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

- B. Round Backer Rods for Cold and Hot Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- C. Round Baker Rods for Cold Applied Joint Sealants; ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- D. Backer Strips for Cold and Hot Applied Joint Sealants: ASTM D 5249, Type 2, of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.4 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install joint-sealant backings of kind indicated to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint-sealant backings.
 - b. Do not stretch, twist, puncture, or tear joint-sealant backings.

- c. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:
 - a. Place joint sealants so they directly contact and fully wet joint substrates.
 - b. Completely fill recesses in each joint configuration.
 - c. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
 - a. Remove excess joint sealant from surfaces adjacent to joints.
 - b. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING

- A. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at the time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.6 PAVEMENT JOINT SEALANT SCHEDULE

- A. Joint Sealant Application: Joints within cement concrete pavement.
 - a. Joint Location:
 - i. Expansion and isolation joints in cast-in-place concrete pavement.
 - ii. Contraction joints in cast-in-place concrete.
 - iii. All other joints as indicated
 - b. Silicone Joint Sealant for Concrete: Single component, self-leveling.
 - c. Urethane Joint Sealant for Concrete: Multi-component, pourable, traffic-grade.
 - d. Joint-Sealant Color: Concrete gray, limestone or color that matches adjacent concrete color.

END OF SECTION 32 1373

SECTION 32 9200

TURF AND GRASSES

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:
 - a. Hydroseeding.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that can cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Existing, on-site topsoil meeting the definition in section 31 1000 Site Clearing, stockpiled during grading operations and not heavily compacted.
- E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 REQUIRED SUBMITTALS:

- A. Qualification Data: For landscape Installer.
- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
 - a. Certification of each seed mixture for turf grass sod. Include identification and location of source and name and telephone number of supplier.
- C. Product Certificates: For fertilizers, from manufacturer.
- D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

- E. Product specifications and certifications for Hydroseed. Include identification and location of source and name and telephone number of supplier.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during calendar year.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.
 - a. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare network or the American Nursery and Landscape Association.
 - b. Experience: Three years' experience in turf installation in addition to requirements in Section 014000 "Quality Requirements."
 - c. Installer's Field Supervisions: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - d. Pesticide Applicator: State licensed, commercial.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.
- B. Bulk Materials:
 - a. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - b. Provide erosion-control measures to prevent erosion displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - c. Accompany each deliver of bulk materials with appropriate certificates.

1.8 FIELD CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods:
 - a. Spring Planting: March 15 to May 15
 - b. Fall Planting: September 1 to October 20.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 – PRODUCTS

2.1 FERTILIZERS

- A. Slow-Release Fertilizer: Granular or pelletized fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - a. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2.2 HYDROSEEDING

- A. Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysis of North America. Provide seed of grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified.
- B. Hydraulic Mulch: HydraCM matrix by North American Green, or approved equal. See Appendix for product specification.
- C. Permanent Grass Seed Mix: Proportioned by weight as follows:
 - a. 85 percent tall turf type fescue cultivars (*Festuca arundinacea* variety).
 - b. 15 percent perennial ryegrass (*Lolium perenne*).

2.3 PESTICIDES

- A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below any mulch layers.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
 - a. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plater, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in the soil within the planting area.
 - b. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - c. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by the Design Team and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures: utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - a. Protect adjacent and adjoining areas, structures, pavement pads, etc. from hydroseeding overspray.
 - b. Protect grade stakes set by others until directed to remove them.

3.3 TURF AREA PREPARATION

- A. Placing Planting Soil: To thickness and grades indicated in civil plans. Provide light compaction only per Section 31 2000 Earth Moving.
 - a. Reduce elevation of planting soil to allow for soil thickness of sod.
- B. Kill and remove all existing weeds.
- C. Verify all areas match the grading plan in the civil plans and provide positive drainage as intended in the plans.
- D. Rake all areas smooth with no bumps, depressions, rills, or eroded areas deeper than 1/2".
- E. Remove all objects on the surface (typically rocks, roots, trash, broken concrete, etc.) larger than 2" in any dimension. Fill depressions left with topsoil.
- F. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- G. Before planting, obtain Owner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- H. Place fertilizer at a rate of 7 lbs/1000 sqft or as recommended by the manufacturer.

3.4 FINISH GRADING WITHIN TRACK AREA

- A. Definition:
 - a. The words "finish grading" as used herein, mean the establishment of the required final grade elevations indicated on the Drawings.
 - b. All surfaces shall be brought to the indicated grades and contours, and left in a "finish-graded" condition, free of all clods, stones larger than 1/4" or weeds and other debris, ready for seeding.
- B. Grading Tolerances:
 - a. Playing field areas shall be graded to a tolerance of +/- 0.04' (0.50 inches) as measured with a 25' string line.

- C. All areas are to be finish graded by the Contractor. Grading machinery shall be equipped with flotation type tires or tracks or be capable of meeting the grading tolerances specified above. Tire or track ruts greater than .50 inches will not be accepted. This operation shall be completed and acceptable to the Owner prior to seeding. Contractor shall be responsible for repair of damaged, finish graded areas until seeding operations begin.
- D. Upon completion of surface preparation, and fertilization operations, and immediately prior to the laying of sod, the areas shall be given a final grading as needed to correct irregularities in the surface, due to the above operations or other causes, and to restore the prescribed grades.

3.5 HYDROSEEDING

- A. Hydroseeding for areas outside of track: Mix specified permanent grass seed mix, temporary grass seed mix, and HydraCM per manufacturer's written requirements. Continue mixing until uniformly blended into a homogeneous slurry suitable for hydraulic application.
 - a. Permanent grass seed mix shall be mixed so 215 lb/acre is applied.
 - b. Temporary seed mix shall be mixed so 10lb/acre is applied.
 - c. Spray-apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that HydraCM component is deposited at not less than 3000 lb/acre dry weight.

3.6 TURF MAINTENANCE

- A. Protection: Protect the area against traffic or other use by placing warning signs, fences, and erecting any barricades that may be required before or immediately after sowing is completed.
- B. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
 - a. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 - b. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 - c. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and to reduce hazards.
- C. Watering: Install and maintain water trucks, temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.
 - a. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system (or use permanent irrigation system) to avoid walking over muddy or newly planted areas.
 - b. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
 - c. Onsite water may be used once the water lines are constructed and functional. Coordinate usage with the Owner.
- D. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when the grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

- a. Mow areas outside the track to a height of 3 to 4 inches.
 - b. Mow areas inside the track to a height of 2 to 3 inches.
- E. Turf Postfertilization: Apply slow-release fertilizer after initial mowing and when grass is dry.
- a. Apply fertilizer at a rate of at least 7 lb/1000 sqft of turf area.

3.7 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by the Owner:
- a. Satisfactory seeded turf: A healthy, uniform, recently mowed, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sqft area and bare spots do not exceed 3 by 3 inches.
 - b. Satisfactory Sodded Turf: A healthy, uniform, recently mowed, well-rooted, even-colored, viable turf been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.
- C. Obtain approval of satisfactory turf for all areas by Owner.

3.8 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents according to manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.9 CLEANUP AND PROTECTION

- A. Promptly remove the soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove waste material, trash, and debris, and legally dispose of them off Owner's property.
- C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout maintenance period and remove as approved by Owner.

3.10 MAINTENANCE SERVICE

- A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape installer. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but not for less than the following periods:
- a. Seeded Turf: As long as required until satisfactory turf is established and approved by Owner.
 - b. Sodded Turf: As long as required and until satisfactory turf is established by the Owner.

END OF SECTION 32 9200

**SECTION 33 1113
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 Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for water service and fire-service mains.
- B. Utility-furnished products include water meters that will be furnished to the site and installed by the Utility.

1.3 DEFINITIONS

- A. EPDM: Ethylene propylene diene terpolymer rubber.
- B. PVC: Polyvinyl chloride plastic.
- C. Utility: Local Utility Company

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.
- C. Operation and Maintenance Data: For water valves and specialties to include emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - a. Comply with requirements of utility company supplying water, include tapping of water mains and backflow prevention.
 - b. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
 - c. Comply with standards of authorities having jurisdiction for fire-suppression water service piping, including materials, hose threads, installation, and testing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to following:
 - a. Ensure that valves are dry and internally protected against rust and corrosion.
 - b. Protect valves against damage to threaded ends and flange faces.
 - c. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage:
 - a. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 - b. 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.
- C. 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.
- D. 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.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Water Distribution 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 water-distribution service according to requirements indicated:
 - a. Coordinate all interruptions with utility company supplying water.
 - b. Do not proceed with interruption of water-distribution service without permission from Owner and utility company supplying water.

1.8 COORDINATION

- A. Coordinate connection to water main with utility company.

PART 2 – PRODUCTS

2.1 PVC PIPE AND FITTINGS

- A. PVC, AWWA Pipe: AWWA C900, SDR No. 21, Class 200, with bell end with gasket, and with spigot end.
- B. PVC, AWWA Pipe: AWWA C900, Class 200, with bell end with gasket, and with spigot end.
 - a. Comply with UL 1285 for fire-service mains if indicated.
 - b. PVC Fabricated Fittings: AWWA C900, Class 200, with bell and spigot or double bell ends. Include elastomeric gasket in each bell.

- c. PVC Molded Fittings: AWWA C907, Class 200, with bell and spigot or double-bell ends. Include elastomeric gasket in each bell.
- d. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile or gray iron standard pattern or AWWA C153, ductile iron compact pattern.
 - i. Gaskets: AWWA C111, rubber.
- e. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile or gray iron standard pattern or AWWA C153, ductile iron compact pattern.
 - i. Glands, Gaskets, and Bolts: AWWA C111, ductile or gray iron glands, rubber gaskets, and steel bolts.

2.2 JOINING MATERIALS

- A. Plastic Pipe Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.3 PIPING SPECIALTIES

- A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.4 GATE VALVES

- A. AWWA, Cast Iron Gate Valves:
 - a. All valves and accessories shall comply with the current Utility Specifications for water main construction.
 - b. Manufacturers: Subject to compliance with Utility requirements, acceptable by Utility.

2.5 GATE VALVE ACCESSORIES AND SPECIALTIES

- A. Tapping-Sleeve Assemblies:
 - a. All tapping sleeves and accessories shall comply with the current Utility specifications.
 - b. Manufacturers: Subject to compliance with Utility requirements, acceptable to Utility

2.6 CHECK VALVES

- A. AWWA, Check Valves:
 - a. All valves and accessories shall comply with current Utility Specifications.
 - b. Manufacturers: Subject to compliance with Utility requirements.
 - c. Description: Swing-check type with resilient seat. Include interior coating according to AWWA C550 and ends to match piping.
 - i. Standard: AWWA C508
 - ii. Pressure Rating: 200 psig.

2.7 CORPORATION VALVES AND CURB VALVES

- A. General: As required by Utility company supplying water.
- B. Manufacturers: Per current Utility Specifications.

2.8 FIRE HYDRANTS

- A. Traffic Model, Dry-Barrel Fire Hydrants with compression valve:
 - a. All fire hydrants shall comply with current Utility Specifications for Water Main Construction.
 - b. Manufacturers: Subject to compliance with Utility requirements. Provide products in accordance with Utility Specifications.

PART 3 – EXECUTION

3.1 EARTHWORK

- A. Refer to Section 31 2000 “Earth Moving” 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 fitting 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.

3.3 PIPING INSTALLATION

- A. Water Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
- B. Water Main Connection: Tap water main according to requirements of water utility and of size and location indicated.
- C. Make connections larger than NPS 2 with tapping machine according to the following:
 - a. Install tapping sleeve and tapping valve according to MSS SP-60
 - b. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 - c. Use tapping machine compatible with valve and tapping sleeve; cut in main. Remove tapping machine and connect water service piping.
 - d. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- D. Comply with NFPA 24 for fire service main piping materials and installation.
- E. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.
- F. Bury piping with depth of cover over top at least 48 inches below finish grade.
- G. Install piping by Local Utility Company trenchless methods, under streets and other obstructions that cannot be disturbed.

- H. Extend water service piping and connect to water supply source in locations and pipe sizes indicated.
- I. 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 as needed or required.

3.4 JOINT CONSTRUCTION

- A. Make pipe joints according to the following:
 - a. PVC piping gasketed joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricate according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.

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:
 - a. Concrete thrust blocks.
 - b. Thrust Collars.
 - c. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bens, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
 - a. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.

3.6 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box. Valve boxes shall be in compliance with Utility Specifications, and as detailed within the civil plans.
- B. AWWA Valves other than gate valves: Comply with AWWA C600 and AWWA M

3.7 WATER METER INSTALLATION

- A. Install water meters, piping, and specialties according to Utility company's specifications. Meter installation will be performed by the Utility company.

3.8 WATER METER BOX INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated. Include valve and test cocks. Install according to requirements of plumbing and health department authorities having jurisdiction.

3.9 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.

3.10 FIRE HYDRANT INSTALLATION

- A. General: Install each fire hydrant with separate gate valve in supply piping, anchor with restrained joints or thrust blocks, and support in upright position. Fire hydrants shall be installed per current Utility Specifications, and as detailed within the plans.
- B. Supply pipe shall have a minimum cover of 42 inches.

3.11 CONNECTIONS

- A. Install all exterior water piping connections per current Utility Specifications and construction requirements.
- B. Connect water distribution piping to utility in water main, in accordance with Utility requirements. Use tapping sleeve and tapping valve.

3.12 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than one-and-one-half times the working pressure for two hours or as required by the Utility company.
- C. Prepare reports of testing activities as needed.
- D. Conduct all waterline tests required by Utility and obtain Utility acceptance of all lines to be public.

3.13 IDENTIFICATION

- A. Install continuous underground THHN-12 solid blue locator wire. All installation and connections shall be per the current Utility Specifications, and as detailed in the civil plans. Underground warning tapes are specified in Section 31 2000 "Earth Moving".

3.14 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
 - a. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before used.
 - b. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
 - c. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:

- i. Fill system or part of system with water/chlorine solution containing at least 50 ppm or chlorine; isolate and allow to stand for 24 hours.
- ii. Drain system or part of system or previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
- iii. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
- iv. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- v. Obtain approval of Utility and Owner.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION 32 1113

**SECTION 33 3113
SITE SANITARY SEWER**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this Section.
 - a. Section 31 1000 – Site Clearing
 - b. Section 31 2000 – Earth Moving

1.2 SUMMARY

Section includes:

- 1. Pipe and fittings.
- 2. Cleanouts.
- 3. Encasement for piping.
- 4. Manholes.

1.3 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.

1.4 SUBMITTALS

- B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals, from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.

1.6 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 Architect, Construction Manager, and Owner no fewer than one week in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of service without Owner's written permission

PART 2 – PRODUCTS

2.1 PVC PIPE AND FITTINGS

- A. PVC Gravity Sewer Piping:
 - 1. Pipe and Fittings: ASTM F 679 PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.

2.2 CLEANOUTS

- A. Cast-Iron Cleanouts:
 - 1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
 - 2. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.3 MANHOLES

- A. Standard Precast Concrete Manholes:
 - 1. Description: ASTM C 478 precast, reinforced concrete, of depth indicated, with provision for sealant joints.
 - 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.
 - 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: ASTM C 990, bitumen or butyl rubber.
 - 8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
 - 9. Steps: Individual ASTM A 615, deformed, ½-inch steel reinforcing rods encased in ASTM D 4101, PP 12-inches wide and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls uniformly at 16-inch intervals max. Omit steps if total depth from floor of manhole to finished grade is less than 24-inches.
 - 10. Grade Rings: Reinforced-concrete rings, 8-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.
- B. Manhole Frames and Covers:
 - 1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser, with 4-inch- minimum-width flange and 26-inch diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to “SANITARY SEWER.”
 - 2. Material: ASTM A 48, Class 35 gray iron unless otherwise indicated.

2.4 CONCRETE

- A. General: Cast-in-place concrete complying with ACI 318, ACI 350/350R, and the following:
 - 1. Cement: ASTM C 150, Type ii
 - 2. Fine Aggregate: ASTM C 33, sand
 - 3. Coarse Aggregate: ASTM C 33, crushed gravel
 - 4. Water: potable

- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.
 - 1. Reinforcing Fabric: ASTM A 185, steel, welded wire fabric, plain.
 - 2. Reinforcing Bars: ASTM A 615, Grade 60 deformed steel.

PART 3 – EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Division 31 Section “Earth Moving.”

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 fitting 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, nonpressure, 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 NPS 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 36-inch cover unless otherwise noted.
 - 4. Install PVC gravity sewer piping according to ASTM D 2321 and ASTM F 1668.
- 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.

PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Join PVC gravity sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints for ASTM D 3034 for elastomeric-gasket joints.
 - 2. Join dissimilar pipe materials with nonpressure-type flexible couplings.

- B. Pipe couplings, expansion joints, and deflection fitting with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 - 1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure 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 MANHOLE INSTALLATION

- A. General: Install manholes complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Form continuous concrete channels and benches between inlets and outlet.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

3.5 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.6 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.
 - 3. Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
 - 4. Extra-Heavy-Duty, top-loading classification cleanout in roads.
- B. Set cleanout frames and covers in earth cast-in-place-concrete block, 24 by 24 by 6 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.7 CONNECTIONS

- A. Connect nonpressure, 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 wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8 CLOSING ABANDONED SANITARY SEWER SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below.
 1. Close open ends of piping with at least 8-inch thick, brick masonry bulkheads.
 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes: Excavate around manhole as required and use either procedure below:
 1. Remove manhole and close open ends of remaining piping.
 2. Remove top of manhole down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade abandoned to Division 31 Section "Earth Moving."

3.9 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.

PART 4 – LIFT STATIONS

4.1 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.
 1. Submit separate report for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.

- B. Test new piping systems, and parts of existing 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.
 - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours advance notice.
 - 4. Submit separate report for each test.
 - 5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
 - a. Fill sewer piping and water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
 - b. Close openings in systems and fill with water.
 - c. Purge air and refill with water.
 - d. Disconnect water supply.
 - e. Test and inspect joints for leaks.
 - 6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Option: Test plastic gravity sewer piping according to ASTM F 1417.
 - b. Option: Test concrete gravity sewer piping according to ASTM C 924.
 - 7. Manholes: Perform hydraulic test according to ASTM C 969.
- 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.

4.2 CLEANING

- A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

PART 5 – LIFT STATIONS

This section intentionally left blank as no lift station required.

PART 6 – FORCE MAIN LINES

This section intentionally left blank as no force main is required.

END OF SECTION 32 1113

**SECTION 33 4100
STORM UTILITY DRAINAGE PIPING**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - a. Pipe and fittings.
 - b. Cleanouts.
 - c. Junction boxes.
 - d. Catch basins.
 - e. Stormwater inlets.
 - f. Trench drains.
 - g. Stormwater detention structures.
 - h. Pipe outlets.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
 - a. Junction Boxes: Include plans, elevations, sections, details, frames, and covers.
 - b. Catch basins, storm water inlets, and junction boxes. Include elevations, sections, details, frames, covers, and grates.
 - c. Stormwater Detention Structures: Include elevations, sections, details, frames, covers, and concrete mix design reports.
 - d. Pipe Outlets: Include elevations, sections, and details.
- C. Field quality control reports.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic structures, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle structures according to manufacturer's written rigging instructions.
- D. Handle catch basins, trench drains, and storm water inlets according to manufacturer's written rigging instructions.

PART 2 – PRODUCTS

2.1 PE PIPE AND FITTINGS

- A. High Density Corrugated PE Pipe with integrally formed smooth waterway AASHTO M 252 and M294, Type S.
 - a. Manufacturer: Advanced Drainage systems (ADS) N-12 HDPE pipe, or approved equal.
 - b. Soil tight gasket joints.

2.2 PVC PIPE AND FITTINGS

- A. PVC Sewer Piping:
 - a. Pipe: ASTM D 3034, SDR 35, PVC sewer pipe with bell and spigot ends for gasket joints.
 - b. ASTM D 3034, PVC with bell ends.
 - c. Gaskets: ASTM F 477, elastomeric seals.

2.3 CONCRETE PIPE AND FITTINGS

- A. Reinforced Concrete Sewer Pipe and Fittings: ASTM C76
 - a. Bell and spigot ends and gasket joints with ASTM C 443, rubber gaskets
 - b. Class 3, minimum, based on depth as detailed in civil plans.
 - c. Class 4, based on depth as detailed in civil plans.
 - d. Class 5, based on depth as detailed in civil plans.

2.4 CLEANOUTS

- A. Plastic Cleanouts:
 - a. Description: HDPE or PVC body with either PVC top or cast iron frame and lid depending on the location. See civil plans for details.

2.5 CATCH BASINS AND JUNCTION BOXES

- A. Standard Precast Concrete Catch Basins and Junction Boxes:
 - a. Description: Per current Local Municipality details and specifications and as shown in the civil plans.

2.6 STORMWATER INLETS

- A. PVC Inlets: As manufactured by Nyloplast and as shown in the civil plans, or approved equal. Include heavy duty frames and grates.
- B. Concrete Inlets: Precast concrete manufactured per current Local Municipality Specifications and details. Include heavy duty frames and grates.

2.7 TRENCH DRAINS

- A. System: ABT, Inc. Trenchformer TFX 12" wide, pre-engineered, cast in place trench drain forming system with 1.04% slope.
- B. Grate: ABT, Inc. high intake slotted, ductile iron TR-12-12.502D grate.

2.8 STORMWATER DETENTION STRUCTURES

- A. Cast-in-Place or precast Concrete, Storm water Detention Structures: Constructed of reinforced-concrete bottom, walls, and top: designed according to current Local Municipality Specifications and as shown on the civil plans.

2.9 PIPE OUTLETS

- A. Concrete Flared End Sections for reinforced concrete pipe (RCP): Per current State Department of Transportation precast concrete flared end section details 732.00N, with concrete toewall.
- B. Galvanized Metal Flared End Sections for plastic pipe: As detailed in the civil plans. Include toe plate extensions per detail.
- C. Riprap: Broken, irregularly sized and shaped, graded stoned as shown in civil plans.

PART 3 – EXECUTION

3.1 EARTHWORK

- A. Refer to Section 31 2000 “Earth Moving” for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans and details indicate location and arrangement of underground storm piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated.
- B. Install piping being 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 use of lubricants, cements, and other installation requirements.
- C. Install gravity-flow, non-pressure drainage piping according to the following:
 - a. Install piping pitched down in the direction of flow.
 - b. Install piping with depths indicated in civil plans. Minimum cover for HDPE pipe shall be maintained per manufacturer’s specifications.
 - c. Install PVC profile gravity sewer piping as detailed in civil plans.
 - d. Install reinforced concrete sewer piping as detailed in civil plans.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, non-pressure drainage piping according to the following:
 - a. Join PVC profile gravity sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasket joints.

- b. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber gasket joints.

3.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade as detailed in civil plans.

3.5 CATCH BASIN AND JUNCTION BOX INSTALLATION

- A. Construct catch basins and junction boxes to sizes and shapes indicated.
- B. Set frames and grates to elevations indicated.

3.6 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct riprap of broken stone, as indicated.
- B. Install flared end sections at all outlets that spill onto grade.

3.7 TRENCH DRAIN INSTALLATION

- A. Construct straight trench drain to sizes and shapes indicated per manufacturer's directions.

3.8 IDENTIFICATION

- A. Materials and their installation are specified in Division 31 2000 "Earth Moving." Arrange for installation of green warning tape directly over piping.
 - a. Use detectable warning tape over nonferrous piping.

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.
 - a. Submit separate reports for each system inspection.
 - b. Defects requiring correction include the following:
 - i. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - ii. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5% of pipe diameter.
 - iii. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - iv. Infiltration: Water leakage into piping.
 - v. Exfiltration: Water leakage from or around piping.
 - c. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 - d. 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.
 - a. Do not enclose, cover, or put into service before inspection and approval.

- b. Test completed piping systems according to requirements of authorities having jurisdiction.
 - c. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advanced notice.
 - d. Submit separate report for each test.
- C. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.
- D. Perform all tests and obtain Local Municipality approval and acceptance of all sewers and rip-rap outlets to be public.

3.10 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Flush with water.

END OF SECTION 33 4100