

PROJECT MANUAL

Design & Construct Elevator & Assembly

Ike Skelton Training Site

Jefferson City, Missouri

Designed By: Connell Architecture, P.C.
2311 East Walnut St., Suite B
Columbia, MO 65201-6430

Date Issued: December 22, 2023

Project No.: T2211-01

STATE *of* MISSOURI

OFFICE *of* ADMINISTRATION
Facilities Management, Design & Construction

SECTION 000107 - PROFESSIONAL SEALS AND CERTIFICATIONS

PROJECT NUMBER: T2211-01

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:

- 1. BRIAN D. CONNELL, AIA
REGISTRATION NUMBER MO A-5036**



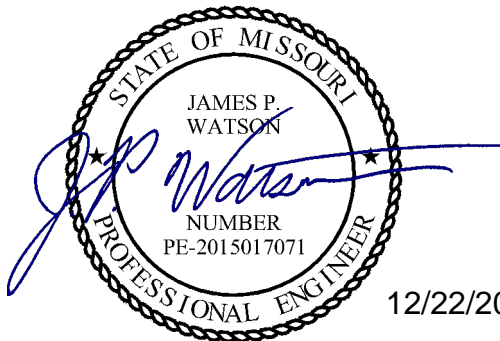
12/22/2023

- 2. JARED W. VERSLUES, P.E.
REGISTRATION NUMBER MO PE-2017000387**



12/22/2023

- 3. JAMES P. WATSON, P.E.
REGISTRATION NUMBER MO PE-2015017071**



12/22/2023

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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>
1.	Cover Sheet	G-001	12/22/23	G-001
2.	Location Maps & Drawing Index	G-002	12/22/23	G-002
3.	1 st Floor Plan – Selective Demolition	AD-100	12/22/23	AD-100
4.	2 nd Floor Plan – Selective Demolition	AD-101	12/22/2023	AD-101
5.	1 st Floor Plan – Addition & Alterations	A-100	12/22/23	A-100
6.	2 nd Floor Plan – Addition & Alterations	A-101	12/22/23	A-101
7.	1 st Floor Reflected Ceiling Plan	A-102	12/22/23	A-102
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9.	Roof Plan	A-104	12/22/23	A-104
10.	Exterior Elevations	A-200	12/22/23	A-200
11.	Elevator Hoistway Section	A-300	12/22/23	A-300
12.	Elevator Hoistway & Machine Room Sections	A-301	12/22/23	A-301
13.	Large Scale Plans	A-400	12/22/23	A-400
14.	Details	A-500	12/22/23	A-500

15.	Door & Hardware Schedule	A-600	12/22/23	A-600
16.	Room Finish Schedule	A-601	12/22/23	A-601
17.	Cover/General Structural Data	S-100	12/22/23	S-100
18.	Foundation Plan	S-200	12/22/23	S-200
19.	Foundation Details	S-210	12/22/23	S-210
20.	2 nd Floor / Low Roof Framing Plan			
		S-300	12/22/23	S-300
21.	Framing Details	S-310	12/22/23	S-310
22.	Framing Details	S-311	12/22/23	S-311
23.	Elevator Roof Framing Plan & Details			
		S-400	12/22/23	S-400
24.	HVAC Plan	M-101	12/22/23	M-101
25.	HVAC Details & Schedules	M-501	12/22/23	M-501
26.	1 st Floor Electrical Plan	E-101	12/22/23	E-101
27.	2 nd Floor Electrical Plan	E-102	12/22/23	E-102
28.	Electrical Details & Schedules	E-501	12/22/23	E-501
29.	1 st Floor Plumbing Plan	P-101	12/22/23	P-101

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. Design & Construct Elevator & Assembly
Ike Skelton Training Site
Jefferson City, Missouri
Project No.: T2211-01

3.0 BIDS WILL BE RECEIVED:

- A. Until: 1:30 PM, February 22, 2024
- B. **Only electronic bids on MissouriBUYS shall be accepted: <https://missouribuys.mo.gov>. Bidder must be registered to bid.**

4.0 DESCRIPTION:

- A. Scope: The project includes the construction of a new elevator hoistway and machine room on the exterior of the existing Military Education Facility.
- 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: 9:00 AM, February 6, 2024, at Ike Skelton Training Site - Military Education Facility, 2302 Militia Drive, Jefferson City, MO.
- 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: Connell Architecture, P.C., Brian Connell, 573-268-6166, email: brianconnell@connellarchitecture.com
- B. Project Manager: Michael Schrader, 573-536-7105, email: michael.schrader@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.

Very Important MissouriBUYS Instructions to Help Submit a Bid Correctly

- A. The bidder shall submit his or her bid and all supporting documentation on MissouriBUYS eProcurement System. No hard copy bids shall be accepted. Go to <https://missouribuys.mo.gov> and register. The bidder must register and complete a profile fully with all required documents submitted prior to submitting a bid.
- B. Once registered, log in.
1. Under "Solicitation" select "View Current Solicitations."
 2. Under "Filter by Agency" select "OA-FMDC-Contracts Chapter 8", then click "Filter Solicitation" button.
 3. Select "Active Solicitations" tab.
 4. To see the Solicitation Summary, click on the Project Number and the summary will open. Click each heading to open detailed information.
- C. Here are simplified instructions for uploading the bid to MissouriBUYS:
1. Find the solicitation by completing Steps 1 through 4 above.
 2. Select the three dots under "Actions." Select "Add New Response."
 3. When the Quote box opens, give the response a title and select "OK."
 4. The detailed solicitation will open. Select "Check All" for the Original Solicitation Documents, open each document, and select "Accept." If this step is not completed, a bid cannot be uploaded. Scroll to the bottom of the page and select "Add Attachments." If you do not see this command, not all documents have been opened and accepted.
 5. The Supplier Attachments box will open. Select "Add Attachment" again.
 6. The Upload Documents box will open. Read the instructions for uploading. Disregard the "Confidential" check box.
 7. Browse and attach up to 5 files at a time. Scroll to bottom of box and select "Upload." The Supplier Attachments box will open. Repeat Steps 5 through 7 if more than 5 files are to be uploaded.
 8. When the Supplier Attachments box opens again and uploading is complete, select "Done." A message should appear that the upload is successful. If it does not, go to the Bidder Response tab and select "Submit."
 9. The detailed solicitation will open. At the bottom select "Close."
 10. Ensure receipt of notifications including current e-mail address are enabled within vendor profile.
- D. Any time a bidder wants to modify the bid, he or she will have to retract, make revisions, and then submit again. Please ensure that "draft" status is not shown. FMDC will open the last response the bidder submits. The bidder may revise and submit the bid up to the close of the solicitation (bid date and time). Be sure to allow for uploading time so that the bid is successfully uploaded prior to the 1:30 PM deadline; we can only accept the bid if it is uploaded before the deadline.
- E. If you want to verify that you are uploading documents correctly, please contact Paul Girouard: 573-751-4797, paul.girouard@oa.mo.gov ; April Howser: 573-751-0053, April.Howser@oa.mo.gov ; or Mandy Roberson: 573-522-0074, Mandy.Roberson@oa.mo.gov.
- F. If you are experiencing login issues, please contact Web Procure Support (Proactis) at 866-889-8533 anytime from 7:00 AM to 7:00 PM Central Time, Monday through Friday. If you try using a userid or password several times that is incorrect, the system will lock you out. Web Procure Support is the only option to unlock you! If you forget your userid or password, Web Procure Support will provide a temporary userid or password. Also, if it has been a while since your last successful login and you receive an "inactive" message, contact Web Procure (Proactis). If you are having a registration issue, you may contact Office of Administration Division of Accounting at 573-751-2971 and ask for the MissouriBUYS vendor team.

IMPORTANT REMINDER REGARDING REQUIREMENT FOR OEO CERTIFICATION

A. SECTION 002113 – INSTRUCTIONS TO
BIDDERS: Article 15.0, Section D1:

As of July 1, 2020, all MBE, WBE, and MBE/WBE contractors, subcontractors, and suppliers must be certified by the State of Missouri, Office of Equal Opportunity. No certifications from other Missouri certifying agencies will be accepted.

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 any one (1) party may be limited in accordance with available supply.
- B. For the convenience of contractors, sub-contractors and suppliers, copies of construction documents are on file at the office of the Director, Division of Facilities Management, Design and Construction and on the Division's web site - <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 also 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 contractor to fulfill in every detail all of the requirements of the contract, nor accepted as a basis for any claims for extra compensation.
- B. Under no circumstances will contractors give their plans and specifications to another contractor. Any bid received from a contractor whose name does not appear on the list of plan holders may be subject to rejection.

4.0 - INTERPRETATIONS

- A. No bidder shall be entitled to rely on oral interpretations as to the meaning of the plans and specifications or the acceptability of alternate products, materials, form or type of construction. Every request for interpretation shall be made in writing and submitted with all supporting documents not less than five (5) working days before opening of bids. Every interpretation made to a bidder will be in the form of an addendum and will be sent as promptly as is practicable to all persons to whom plans and specifications have been issued. All such addenda shall become part of the contract documents.
- B. Approval for an "acceptable substitution" issued in the form of an addendum as per Paragraph 4A above, and as per Article 3.1 of the General Conditions; ACCEPTABLE SUBSTITUTIONS shall constitute approval for use in the project of the product.
- C. An "acceptable substitution" requested after the award of bid shall be approved if proven to the satisfaction of the Owner and the Designer as per Article 3.1, 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.
- D. A request for "Acceptable Substitutions" shall be made on the Section 006325 Substitution Request Form. The request shall be sent directly to the project Designer. A copy of said request should also be mailed to the Owner, Division of Facilities Management, Design and Construction, Post Office Box 809, Jefferson City, Missouri 65102.

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 or their bid will be rejected for being non-responsive.

Depending on the specific project requirements, **the following is a GENERIC list** of all possible bid forms that may be due with bid submittals and times when they may be due. Please check for specific project requirements on the proposal form (Section 004113). ***Not all of the following bid forms may be required to be submitted.***

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

- B. All bids shall be submitted without additional terms and conditions, modification or reservation on the bid forms with each space properly filled. Bids not on these forms will be rejected.
- C. 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 on the bid form, Section 004113. Failure of the contractor to submit 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 closing, or if on notification of award refuses or is unable to execute tendered contract, provide an acceptable performance and payment bond, provide evidence of required insurance coverage and/or provide required copies of affirmative action plans within ten (10) working days after such tender.
- D. The 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. Bid bonds will only be returned upon request.

6.0 - SIGNING OF BIDS

- A. A bid from an individual shall be signed as noted on the Bid Form.
- B. 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.
- C. A bid from a limited liability company (LLC) shall be signed by a manager or a managing member of the LLC.
- D. A bid from a corporation shall have the correct corporate name thereon and the signature of an authorized officer of the corporation manually written. Title of office held by the person signing for the corporation shall appear, along with typed name of said individual. Corporate license number shall be provided and, if a corporation organized in a state other than Missouri, a Certificate of Authority to do business in the State of Missouri shall be attached. In addition, for corporate proposals, the President or Vice-President should sign as the bidder. If the signator is other than the corporate president or vice president, the bidder must provide satisfactory evidence that the signator has the legal authority to bind the corporation.

- E. 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.
- F. The Bidder should include its corporate license number on the Bid Form and, if the corporation is organized in a state other than Missouri, a Certificate of Authority to do business in the State of Missouri shall be attached to the bid form.

7.0 - RECEIVING BID SUBMITTALS

- A. It is the bidder's sole responsibility to assure receipt by Owner of bid submittals by the date and time specified in the Invitation for Bid. Bids received after the date and time specified shall not be considered by the Owner.
- B. Bids must be submitted through the MissouriBUYS statewide eProcurement system (<https://www.missouribuys.mo.gov/>) in accordance with the instructions for that system. The Owner shall only accept bids submitted through MissouriBUYS. Bids received by the Owner through any other means, including hard copies, shall not be considered and will be discarded by the Owner unopened.
- C. To respond to an Invitation for Bid, the Bidder must first register with MissouriBUYS by going through the MissouriBUYS Home Page (<https://www.missouribuys.mo.gov/>), clicking the "Register" button at the top of the page, and completing the Vendor Registration. Once registered, the Bidder accesses its account by clicking the "Login" button at the top of the MissouriBUYS Home Page. Enter your USERID and PASSWORD, which the Bidder will select. Under Solicitations, select "View Current Solicitations." A new screen will open. Under "Filter by Agency" select "OA-FMDC-Contracts Chapter 8." Under "Filter by Opp. No." type in the State Project Number. Select "Submit." Above the dark blue bar, select "Other Active Opportunities." To see the Solicitation Summary, single click the Opp. No. (Project Number) and the summary will open. Single quick click each blue bar to open detailed information. The Bidder must read and accept the Original Solicitation Documents and complete all identified requirements. The Bidder should download and save all of the Original Solicitation Documents on its computer so that the Bidder can prepare its response to these documents. The Bidder should upload its completed response to the downloaded documents as an attachment to the electronic solicitation response.
- D. Step-by-step instructions for how a registered vendor responds to a solicitation electronically are provided in Section 001116 – Invitation For Bid.
- E. The Bidder shall submit its bid on the forms provided by the Owner on MissouriBUYS with each space fully and properly completed, including all amounts required for alternate bids, unit prices, cost accounting data, etc. The Owner may reject bids that are not on the Owner's forms or that do not contain all requested information.
- F. No Contractor shall stipulate in his bid any conditions not contained in the specifications or standard bid form contained in the contract documents. To do so may subject the Contractor's bid to rejection.
- G. The completed forms shall be without interlineations, alterations or erasures.

8.0 - MODIFICATION AND WITHDRAWAL OF BIDS

- A. Bidder may withdraw his bid at any time prior to 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. The Bidder shall modify his or her original bid by submitting a revised bid on MissouriBUYS.

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 by way of limitation, contracts for the furnishing and installation of furniture, equipment, machines, appliances and other apparatus.

- C. The Owner shall award a contract to the lowest, responsive, 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 bid shall be considered binding upon the Owner until the written contract has been properly executed, a satisfactory bond has been furnished, evidence of required insurance coverage, submittal of executed Section 004541, Affidavit of Work Authorization form, documentation evidencing enrollment and participation in a federal work authorization program has been received and an affirmative action plan submitted. Failure to execute and return the contract and associated documents within the prescribed period of time 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.
- F. If the successful bidder is doing business in the State of Missouri under a fictitious name, he 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.
- G. Any successful bidder which is a corporation organized in a state other than Missouri shall furnish to the Owner, attached to the Bid Form, a properly certified copy of its current Certificate of Authority to do business in the State of Missouri, such certificate to remain on file with the Owner. No contract will be awarded by the Owner unless such certificate is furnished by the bidder.
- H. Any successful bidder which is a corporation organized in the State of Missouri shall furnish at its own cost to the Owner, if requested, a Certificate of Good Standing issued by the Secretary of State, such certificate to remain on file with the Owner.
- I. 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.
- J. 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. Section-004541, Affidavit of Work Authorization is located on the MissouriBUYS solicitation for this project. Bidders must also submit an E-Verify Memorandum before the Owner may award a contract to the Bidder. Information regarding an E-Verify is located at <https://www.uscis.gov/e-verify/>. The contractor shall be responsible for ensuring that all subcontractors and suppliers associated with this contract enroll in E-Verify.

10.0 - CONTRACT SECURITY

- A. The successful bidder shall furnish a performance/payment bond as set forth in General Conditions Article 6.1 on a condition 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, 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. Failure to list the Bidder's firm, or a subcontractor for each category of work identified on the Bid Form or the listing of more than one subcontractor for any category without designating the portion of work to be performed by each shall be cause for rejection of the bid. 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, 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 person'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. Pursuant to section 34.600, RSMo, 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 as defined in section 34.600, RSMo, 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 requested to complete and submit the applicable portion of Section 004545 - Anti-Discrimination Against Israel Act Certification with their 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. If the exhibit is not submitted, the Owner shall rescind its Intent to Award and move to the next lowest, responsive, responsible bidder.

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 non-responsive, and its bid shall be rejected.
2. The Bidder should submit with its bid all of 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 appropriate 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 Bidder that is a SDVE doing business as Missouri firm, corporation, or individual, or that maintains a Missouri office or place of business, shall receive a three-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 becomes 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. The form is available on the MissouriBUYs solicitation for this project.

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.) In order 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 actually 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 Administration, Division of Purchasing and Material Management or by the Department of Veterans Affairs.
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 Division of Purchasing and Materials Management's online SDVE directory (<https://oa.mo.gov/sites/default/files/sdvelisting.pdf>) or the Department of Veterans Affairs' directory (<https://vetbiz.va.gov/basic-search/>).
3. Additional information, clarifications, etc., regarding the listings in the directories may be obtained by calling the Division at (573)751-3339 and asking to speak to 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 GFE forms are located on the MissouriBUYS solicitation for this project. 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 determined 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;
3. If no bidder has obtained any participation in a particular category (MBE/WBE/SDVE) or made a good faith effort to do so, the Director may waive that goal rather than rebid.

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 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 non-responsive 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 this 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.
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
DIVISION OF FACILITIES MANAGEMENT,
DESIGN AND CONSTRUCTION
*MBE/WBE/SDVE DIRECTORIES***

The MBE/WBE Directory for goods and services is maintained by the Office of Equal Opportunity (OEO) and is located at the following web address:

<https://apps1.mo.gov/MWBCertifiedFirms/>

The SERVICE DISABLED VETERAN ENTERPRISE (SDVE) Directories may be accessed at the following web addresses:

<https://oeo.mo.gov/sdve-certification-program/>

<https://veterans.certify.sba.gov/#search>



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, on behalf of the Missouri National Guard.

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: **Design & Construct Elevator & Assembly
Ike Skelton Training Site
Jefferson City, Missouri**

Project Number: **T2211-01**

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

ARTICLE 2. TIME OF COMPLETION

The contract performance time is **160 working days** from the transmittal date of this agreement. The contract completion date is **MONTH, DAY, YEAR**. This time includes ten (10) working days for the Contractor to receive, sign and return the contract form along with required bonding and insurance certificates. Failure of the Contractor to provide correct bonding and insurance within the ten (10) working days shall not be grounds for a time extension. Receipt of proper bonding and insurance is a condition precedent to the formation of the contract and if not timely received, may result in forfeiture of the Contractor's bid security. Work may not commence until the Owner issues a written Notice to Proceed and must commence within seven (7) working days thereafter.

ARTICLE 3. LIQUIDATED DAMAGES

Whenever time is mentioned in this contract, time shall be and is of the essence of this contract. The Owner would suffer a loss should the Contractor fail to have the work embraced in this contract fully completed on or before the time above specified. THEREFORE, the parties hereto realize in order to adjust satisfactorily the damages on account of such failure that it might be impossible to compute accurately or estimate the amount of such loss or damages which the Owner would sustain by reason of failure to complete fully said work within the time required by this contract. The Contractor hereby covenants and agrees to pay the Owner, as and for **liquidated damages, the sum of \$700** 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: \$

TOTAL CONTRACT AMOUNT: (\$CONTRACT 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)
- ix. Affidavit for Affirmative Action (Section 005414)
- 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)
- 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.

Further, if the Contractor provides any “personal information” as defined in §105.1500, RSMo concerning an entity exempt from federal income tax under Section 501(c) of the Internal Revenue Code of 1986, as amended, the Contractor understands and agrees that it is voluntarily choosing to enter into a state contract and providing such information for that purpose. The state will treat such personal information in accord with §105.1500, RSMo.

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



STATE OF MISSOURI
 OFFICE OF ADMINISTRATION
 DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION
AFFIDAVIT FOR AFFIRMATIVE ACTION

PROJECT NUMBER

NAME	First being duly sworn on oath states: that
he/she is the <input type="checkbox"/> sole proprietor <input type="checkbox"/> partner <input type="checkbox"/> officer or <input type="checkbox"/> manager or managing member of	
NAME	a <input type="checkbox"/> sole proprietorship <input type="checkbox"/> partnership <input type="checkbox"/> limited liability company (LLC)
or <input type="checkbox"/> corporation, and as such, said proprietor, partner, or officer is duly authorized to make this affidavit on behalf of said sole proprietorship, partnership, or corporation; that under the contract known as	

PROJECT TITLE

Less than 50 persons in the aggregate will be employed and therefore, the applicable Affirmative Action requirements as set forth in Article 1.4 of the General Conditions of the State of Missouri have been met.

PRINT NAME & SIGNATURE	DATE
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NOTARY INFORMATION

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

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	\$	\$	



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

PROJECT NUMBER

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

State of _____ personally came and appeared _____

(NAME)

_____ of the _____

(POSITION) (NAME OF THE COMPANY)

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

(NAME OF PROJECT)

Located at _____ in _____ County

(NAME OF THE INSTITUTION)

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

SIGNATURE

NOTARY INFORMATION

NOTARY PUBLIC EMBOSSER OR BLACK INK RUBBER STAMP SEAL	STATE	COUNTY (OR CITY OF ST. LOUIS)
	SUBSCRIBED AND SWORN BEFORE ME, THIS	
	DAY OF	YEAR
	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, tool, 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, and 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 take affirmative action to insure 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.

B. The Contractor and his subcontractors shall develop, implement, maintain and submit in writing to the Owner an affirmative action program if at least fifty (50) persons in the aggregate are employed under this contract. If less than fifty (50) persons in the aggregate are to be employed under this contract, the Contractor shall submit, in lieu of the written affirmative action program, a properly executed Affidavit for Affirmative Action

in the form included in the contract specifications. For the purpose of this section, an "affirmative action program" means positive action to influence all employment practices (including, but not limited to, recruiting, hiring, promoting and training) in providing equal employment opportunity regardless of race, color, sex, national origin, religion, age (where the person affected is between age 40 and 70), disabled and Vietnam-era veteran status, and disability. Such "affirmative action program" shall include:

1. A written policy statement committing the total organization to affirmative action and assigning management responsibilities and procedures for evaluation and dissemination;
2. The identification of a person designated to handle affirmative action;
3. The establishment of non-discriminatory selection standards, objective measures to analyze recruitment, an upward mobility system, a wage and salary structure, and standards applicable to lay-off, recall, discharge, demotion and discipline;
4. The exclusion of discrimination from all collective bargaining agreements; and
5. Performance of an internal audit of the reporting system to monitor execution and to provide for future planning.

In the enforcement of this non-discrimination clause, the Owner may use any reasonable procedures available, including, but not limited to: requests, reports, site visits and inspection of relevant documents of contractors and subcontractors.

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

ARTICLE 1.5 - ANTI-KICKBACK

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

insurance contract, or any other contract pertaining to the project.

ARTICLE 1.6 - PATENTS AND ROYALTIES

- A. The Contractor shall hold and save the Owner and its officers, agents, servants and employees harmless from liabilities of any nature or kind, including cost and expenses, for, or on account of, any patented or unpatented invention, process, article or appliance manufactured or used in the performance of this contract, including its use by the Owner, unless otherwise specifically stipulated in the contract documents.
- B. If the Contractor uses any design, device or materials covered by letters, patent or copyright, the Contractor shall provide for such use by suitable agreement with the Owner of such patented or copyrighted design, device or material. It is mutually agreed and understood, without exception, that the contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his sureties shall indemnify and save harmless the Owner of the project from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or materials or any trademark or copyright in connection with work agreed to be performed under this contract and shall indemnify the Owner for any cost, expense or damage it may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

ARTICLE 1.7 - PREFERENCE FOR AMERICAN AND MISSOURI PRODUCTS AND SERVICES

- A. By virtue of statutory authority a preference will be given to Missouri labor and to products of mines, forests and quarries of the state of Missouri when they are found in marketable quantities in the state, and all such materials shall be of the best quality and suitable character that can be obtained at reasonable market prices, all as provided for in Section 8.280, Missouri Revised Statutes and Cumulative Supplements.
- B. Furthermore, pursuant to Section 34.076 Missouri Revised Statutes and Cumulative Supplements, a preference shall be given to those persons doing business as Missouri firms, corporations, or individuals, or which maintain Missouri offices or places of business, when the quality of performance promised is equal or better and the price quoted is the same or less. In addition, in order for a non-domiciliary bidder to be successful, his bid must be that same percentage lower than a domiciliary Missouri bidder's bid, as would be

required for a Missouri bidder to successfully bid in the non-domiciliary state.

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

ARTICLE 1.8 - COMMUNICATIONS

- A. All notices, requests, instructions, approvals and claims must be in writing and shall be delivered to the Designer and copied to the Construction Representative for the project except as required by Article 1.12 Disputes and Disagreements, or as otherwise specified by the Owner in writing as stated in Section 012600. Any such notice shall be deemed to have been given as of the time of actual receipt.
- B. The Contractor shall attend on-site progress and coordination meetings, as scheduled by the Construction Representative, no less than once a month.
- C. The Contractor shall ensure that major subcontractors and suppliers shall attend monthly progress meetings as necessary to coordinate the work, and as specifically requested by the Construction Representative.

ARTICLE 1.9 - SEPARATE CONTRACTS AND COOPERATION

- A. The Owner reserves the right to let other contracts in connection with this work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate his work with theirs.
- B. The Contractor shall consult the drawings for all other contractors in connection with this work. Any work conflicting with the above shall be brought to the attention of the Owner's Representative before the work is performed. If the Contractor fails to do this, and constructs any

work which interferes with the work of another contractor, the Contractor shall remove any part so conflicting and rebuild same, as directed by the Owner's Representative at no additional cost to the Owner.

- C. Each contractor shall be required to coordinate his work with other contractors so as to afford others reasonable opportunity for execution of their work. No contractor shall delay any other contractor by neglecting to perform contract work at the proper time. If any contractor causes delay to another, they shall be liable directly to that contractor for such delay in addition to any liquidated damages which might be due the Owner.
- D. Should the Contractor or project associated subcontractors refuse to cooperate with the instructions and reasonable requests of other Contractors or other subcontractors in the overall coordinating of the work, the Owner may take such appropriate action and issue directions, as required, to avoid unnecessary and unwarranted delays.
- E. Each Contractor shall be responsible for damage done to Owner's or other Contractor's property by him/her or workers in his employ through their fault or negligence.
- F. Should a Contractor sustain any damage through any act or omission of any other Contractor having a contract with the Owner, the Contractor so damaged shall have no claim or cause of action against the Owner for such damage, but shall have a claim or cause of action against the other Contractor to recover any and all damages sustained by reason of the acts or omissions of such Contractor. The phrase "acts or omissions" as used in this section shall be defined to include, but not be limited to, any unreasonable delay on the part of any such contractors.

ARTICLE 1.10 - ASSIGNMENT OF CONTRACT

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

ARTICLE 1.11 - INDEMNIFICATION

- A. Contractor agrees to indemnify and save harmless Owner and its respective commissioners, officers, officials, agents, consultants and employees and Designer, their agents, servants and employees, from and against any and all liability for damage arising from injuries to persons or damage to property occasioned by any acts or omissions of Contractor, any subcontractors, agents, servants or employees, including any and all expense, legal or otherwise, which may be incurred by Owner or Designer, its agents, servants or employees, in defense of any claim, action or suit.
- B. The obligations of the Contractor under this paragraph shall not extend to the liability of the Designer, his agents or employees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, contract changes, design or specifications, or (2) giving of or the failure to give directions or instructions by the Designer, his agents or employees as required by this contract documents provided such giving or failure to give is the primary cause of the injury or damage.

ARTICLE 1.12 - DISPUTES AND DISAGREEMENTS

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

ARTICLE 2 -- OWNER/DESIGNER RESPONSIBILITIES

- A. The Owner shall give all orders and directions contemplated under this contract relative to the execution of the work. During progress of work the Owner will be represented at the project site by the Construction Representative and/or Designer, whose responsibilities are to see that this contract is properly fulfilled.
- B. The Owner shall at all times have access to the work whenever it is in preparation or progress. The Contractors shall provide proper facilities for such access and for inspection and supervision.
- C. All materials and workmanship used in the work shall be subject to the inspection of the Designer and Construction Representative, and any work which is deemed defective shall be removed, rebuilt or made good immediately upon notice.

The cost of such correction shall be borne by the Contractor. Contractor shall not be entitled to an extension of the contract completion date in order to remedy defective work. All rejected materials shall be immediately removed from the site of the work.

- D. If the Contractor fails to proceed at once with the correction of rejected defective materials or workmanship, the Owner may, by separate contract or otherwise, have the defects remedied or rejected. Materials removed from the site and charge the cost of the same against any monies which may be due the Contractor, without prejudice to any other rights or remedies of the Owner.
- E. Failure or neglect on the part of Owner to observe faulty work, or work done which is not in accordance with the drawings and specifications shall not relieve the Contractor from responsibility for correcting such work without additional compensation.
- F. The Owner shall have the right to direct the Contractor to uncover any completed work.
 - 1. If the Contractor fails to adequately notify the Construction Representative and/or Designer of an inspection as required by the Contract Documents, the Contractor shall, upon written request, uncover the work. The Contractor shall bear all costs associated with uncovering and again covering the work exposed.
 - 2. If the Contractor is directed to uncover work, which was not otherwise required by the Contract Documents to be inspected, and the work is found to be defective in any respect, no compensation shall be allowed for this work. If, however, such work is found to meet the requirements of this contract, the actual cost of labor and material necessarily involved in the examination and replacement plus 10% shall be allowed the Contractor.
- G. The Designer shall give all orders and directions contemplated under this contract relative to the scope of the work and shall give the initial interpretation of the contract documents.
- H. The Owner may file a written notice to the Contractor to dismiss immediately any subcontractors, project managers, superintendents, foremen, workers, watchmen or other employees whom the Owner may deem incompetent, careless or a hindrance to proper or timely execution of the work. The Contractor shall comply with such notice as promptly as practicable without detriment to the work or its progress.

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

ARTICLE 3 -- CONTRACTOR RESPONSIBILITIES

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

ARTICLE 3.1 -- ACCEPTABLE SUBSTITUTIONS

- A. The Contractor may request use of any article, device, product, material, fixture, form or type of construction which in the judgment of the Owner and Designer is equal in all respects to that named. Standard products of manufacturers other than those specified will be accepted when, prior to the ordering or use thereof, it is proven to the satisfaction of the Owner and Designer that they are equal in design, strength, durability, usefulness and convenience for the purpose intended.
- B. Any changes required in the details and dimensions indicated on the drawings for the substitution of products other than those specified shall be properly made at the expense of the Contractor requesting the substitution or change.
- C. The Contractor shall submit a request for such substitutions in writing to the Owner and Designer within twenty (20) working days after the date of the "Notice to Proceed." Thereafter no consideration will be given to alternate forms of accomplishing the work. This Article does not preclude the Owner from exercising the provisions of Article 4 hereof.
- D. Any request for substitution by the Contractor shall be submitted in accordance with SECTION 002113 - INSTRUCTIONS TO BIDDERS.
- E. When a material has been approved, no change in brand or make will be permitted unless:
 - 1. Written verification is received from the manufacturer stating they cannot make delivery on the date previously agreed, or
 - 2. Material delivered fails to comply with contract requirements.

ARTICLE 3.2 -- SUBMITTALS

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

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

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

- B. All subcontractors' shop drawings and schedules shall be submitted by the Contractor and shall bear evidence that Contractor has received, reviewed, and approved them. Any shop drawings and schedules submitted without this evidence will be returned to the Contractor for resubmission.
- C. The Contractor shall include with the shop drawing, a letter indicating any and all deviations from the drawings and/or specifications. Failure to notify the Designer of such deviations will be grounds for subsequent rejection of the related work or materials. If, in the opinion of the Designer, the deviations are not acceptable, the Contractor will be required to furnish the item as specified and indicated on the drawings.
- D. The Designer shall check shop drawings and schedules with reasonable promptness and approve them only if they conform to the design concept of the project and comply with the information given in the contract documents. The approval shall not relieve the Contractor from the responsibility to comply with the drawings and specifications, unless the Contractor has called the Designer's attention to the deviation, in writing, at the time of submission and the Designer has knowingly approved thereof. An approval of any such modification will be given only under the following conditions:
 - 1. It is in the best interest of the Owner
 - 2. It does not increase the contract sum and/or completion time
 - 3. It does not deviate from the design intent
 - 4. It is without prejudice to any and all rights under the surety bond.
- E. No extension of time will be granted because of the Contractor's failure to submit shop drawings and schedules in ample time to allow for review,

possible resubmission, and approval. Fabrication of work shall not commence until the Contractor has received approval. The Contractor shall furnish prints of approved shop drawings and schedules to all subcontractors whose work is in any way related to the work under this contract. Only prints bearing this approval will be allowed on the site of construction

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

ARTICLE 3.3 – AS-BUILT DRAWINGS

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

ARTICLE 3.4 – GUARANTY AND WARRANTIES

- A. General Guaranty
 - 1. Neither the final certificate of payment nor any provision in the contract documents nor partial use or occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with contract requirements.
 - 2. The Contractor or surety shall remedy any defects in the work and pay for any damage to property resulting there from which shall appear within a period of one (1) year from the date of substantial completion unless a longer period is otherwise specified or a differing guaranty period has been established in the substantial completion certificate. The Owner will give notice of observed defects with reasonable promptness.
 - 3. In case of default on the part of the Contractor in fulfilling this part of this contract, the Owner may correct the work or repair the

damage and the cost and expense incurred in such event shall be paid by or recoverable from the Contractor or surety.

4. The work will be free from defects not inherent in the quality required or permitted, and that the Work will conform to the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's guaranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment

B. Extended Warranty

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

ARTICLE 3.5 -- OPERATION AND MAINTENANCE MANUALS

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

1. Start-up and Shut-down Procedures: Provide a step-by-step write up of all major equipment. When manufacturer's printed start-up, trouble shooting and shut-down procedures are available; they may be incorporated into the operating manual for reference.
2. Operating Instructions: Written operating instructions shall be included for the efficient and safe operation of all equipment.
3. Equipment List: List of all major equipment as installed shall be prepared to include model number, capacities, flow rate, name place data, shop drawings and air and water balance reports.
4. Service Instructions: Provide the following information for all pieces of equipment.

- a. Recommended spare parts including catalog number and name of local supplier or factory representative.
- b. Belt sizes, types, and lengths.
- c. Wiring diagrams.

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

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

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

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

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

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

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

ARTICLE 3.6 – OTHER CONTRACTOR RESPONSIBILITIES

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

- B. Contractor shall, at all times, enforce strict discipline and good order among his employees,

and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him/her.

- C. The Contractor shall supply sufficient labor, material, plant and equipment and pay when due any laborer, subcontractor or supplier for supplies furnished and otherwise prosecute the work with diligence to prevent work stoppage and insure 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 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.
 - 4. Written Affirmative Action Plans as required in Article 1.4.
- 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: Brian Connell
Connell Architecture, P.C.
2311 East Walnut St. Suite B
Columbia, MO 65201-6430
Telephone: 573-268-6166
Email: brianconnell@connellarchitecture.com

MONG Project Manager Joseph Schaefer
Missouri National Guard-CFMO Office
6819a North Boundary Road
Jefferson City, Missouri 65101
Telephone: 573-690-4945
Email: joseph.e.schaefer10.nfg@army.mil

Construction Representative: Brian Hogue
Division of Facilities Management, Design and Construction
301 W High St.
Jefferson City, MO 65102
Telephone: 573-751-2697
Email: brian.hogue@oa.mo.gov

Project Manager: Michael Schrader
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, Missouri 65101
Telephone: 573-536-7105
Email: michael.schrader@oa.mo.gov

Contract Specialist: Paul Girouard
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, Missouri 65102
Telephone: (573) 751-4797
Email: Paul.Girouard@oa.mo.gov

3.0 FURNISHING CONSTRUCTION DOCUMENTS:

- A. The Owner will furnish the Contractor with approximately 1 complete sets of drawings and specifications at no charge.
- B. The Owner will furnish the Contractor with approximately 1 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.

4.0 SAFETY REQUIREMENTS

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

5.0 ENVIRONMENTAL MANAGEMENT SYSTEM (eMS):

The Missouri Army National Guard (MOARNG) has implemented an Environmental Management System (eMS). One of the key components of the eMS is the establishment of an Environmental Policy that must be

communicated to all persons working for or on behalf of the organization including all suppliers and contractors. This policy stresses commitment to compliance with accepted environmental practices, and meeting or exceeding applicable environmental requirements, legal and otherwise. This policy also stresses commitment to waste minimization, pollution prevention, and management of personnel, processes, real property, and materials in a manner to reduce environmental impacts. The policy is available upon request to all parties by contacting the Environmental Management Office at (573) 638-9514.

Missouri

Division of Labor Standards

WAGE AND HOUR SECTION



MICHAEL L. PARSON, Governor

Annual Wage Order No. 30

Section 026
COLE 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 _____

Todd Smith, Director
Division of Labor Standards

Filed With Secretary of State: _____ **March 10, 2023**

Last Date Objections May Be Filed: **April 10, 2023**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	\$60.26
Boilermaker	\$28.77*
Bricklayer	\$55.66
Carpenter	\$49.39
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	\$43.32
Plasterer	
Communications Technician	\$57.11
Electrician (Inside Wireman)	\$58.40
Electrician Outside Lineman	\$28.77*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	\$98.59
Glazier	\$28.77*
Ironworker	\$62.53
Laborer	\$43.32
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	\$28.77*
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	\$62.81
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	\$41.55
Plumber	\$68.06
Pipe Fitter	
Roofer	\$52.39
Sheet Metal Worker	\$56.48
Sprinkler Fitter	\$64.54
Truck Driver	\$28.77*
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
COLE County

Section 026

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	\$53.39
Millwright	
Pile Driver	
Electrician (Outside Lineman)	\$28.77*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	\$47.92
General Laborer	
Skilled Laborer	
Operating Engineer	\$60.89
Group I	
Group II	
Group III	
Group IV	
Truck Driver	\$47.77
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 **Design & Construct Elevator & Assembly – Military Education Facility located at the Ike Skelton Training Site.**
 - 1. Project Location: Ike Skelton Training Site, 2302 Militia Drive, Jefferson City, Missouri 65101.
 - 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 65270.
- B. Contract Documents, dated **December 22, 2023** were prepared for the Project by **Connell Architecture, P.C. ▪ 2311 East Walnut Street ▪ Suite B ▪ Columbia, Missouri 65201.**
- C. The Work of the project is defined by the Contract Documents and consists of a Base Bid.
 - 1. Base Bid: The Work of the Base Bid consists of furnishing all labor, materials, equipment and services to construct a new elevator hoistway and machine room on the exterior of the existing Military Education Facility, including the selective demolition of existing improvements required to receive the new work, the installation of the new elevator and elevator machinery including all assemblies, components and accessories required to make a complete weathertight and operational installation of a new elevator and accessible entrance doors in the Military Education Facility located at the Ike Skelton Training Site, 2302 Militia Drive, Jefferson City, Missouri 65101.
- D. The Work will be constructed under a single prime contract.

1.3 WORK SEQUENCE

- A. The Work will be conducted in a single phase.
 - 1. The Contractor shall coordinate work sequence with the Owner and Construction Administrator.

1.4 CONTRACTOR USE OF PREMISES

- A. General: Comply with Section 013513.28 – Site Security and Health Requirements that regulates controlled access, work hours, and contractor’s use of the site during the construction period.
- B. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy and use by the public.
 2. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Use of the Existing Buildings: Maintain the existing buildings in a weathertight condition throughout the construction period. Repair damage cause by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

1.5 OCCUPANCY REQUIREMENTS

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012100 – ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Contract Change.
- B. Types of allowances include the following:
 - 1. Weather allowances.
- C. Related Sections include the following:
 - 1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Contract Changes for allowances.
 - 2. Division 1 Section "Unit Prices" for procedures for using unit prices.

1.3 WEATHER ALLOWANCE

- A. Included within the completion period for this project are a specified number of “bad weather” days (see Schedule of Allowances).
- B. In the event weather conditions preclude performance of critical work activities for 50% or more of the Contractor’s scheduled workday, that day shall be declared unavailable for work due to weather (a “bad weather” day) and charged against the above allowance. Critical work activities will be determined by review of the Contractor’s current progress schedule.
- C. The Contractor’s Representative and the Construction Administrator shall agree monthly on the number of “bad weather” days to be charged against the allowance. This determination will be documented in writing and be signed by the Contractor and the Construction Administrator. If there is a failure to agree on all or part of the “bad weather” days for a particular month, that disagreement shall be noted on this written document and signed by each party’s representative. Failure of the Contractor’s representative to sign the “bad weather” day documentation after it is presented, with or without the notes of disagreement, shall constitute agreement with the “bad weather” day determination contained in that document.
- D. There will be no modification to the time of contract performance due solely to the failure to deplete the “bad weather” day allowance.

1.4 SUBMITTALS

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALLOWANCES

- A. Weather Allowance: Included within the completion period for this Project are Ten (10) “bad weather” days.

END OF SECTION 012100

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) work days of starting construction operations, submit a list of key personnel assignments including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
 - 1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 PROJECT MEETINGS

- A. The Owner's Construction Representative will schedule a Pre-Construction Meeting prior to beginning of construction. The date, time, and exact place of this meeting will be

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

1. Minutes: Designer will record and distribute meeting minutes.
- B. Progress Meetings: The Owner's Construction Representative will conduct Monthly Progress Meetings as stated in Articles 1.8.B and 1.8.C of Section 007213 "General Conditions".
1. Minutes: Designer will record and distribute to Contractor the meeting minutes.
- C. Preinstallation Conferences: Contractor shall conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of Manufacturers and Fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Designer and Owner's 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 Contract Changes
 - 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 and number
 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 parties' communication except for Administrative Users. **DO NOT POST PRIVATE OR YOUR COMPANY CONFIDENTIAL ITEMS IN THE DATABASE!**
 3. Document Integration:
 - a. Documents of various types shall be logically related to one another and discoverable. For example, requests for information, daily field reports, supplemental sketches and photographs shall be capable of reference as related records.
 4. Reporting:
 - a. The system shall be capable of generating reports for work in progress, and logs for each document type. Summary reports generated by the system shall be available for team members.
 5. Notifications and Distribution:
 - a. Document distribution to project members shall be accomplished both within the extranet system and via email as appropriate. Project document distribution to parties outside of the project communication system shall be accomplished by secure email of outgoing documents and attachments, readable by a standard email client.
 6. Required Document Types:
 - a. RFI, Request for Information.
 - b. Submittals, including record numbering by drawing and specification section.
 - c. Transmittals, including record of documents and materials delivered in hard copy.
 - d. Meeting Minutes.
 - e. Application for Payments (Draft or Pencil).
 - f. Review Comments.

- g. Field Reports.
 - h. Construction Photographs.
 - i. Drawings.
 - j. Supplemental Sketches.
 - k. Schedules.
 - l. Specifications.
 - m. Request for Proposals
 - n. Designer's Supplemental Instructions
 - o. Punch Lists
- H. Record Keeping: Except for paper documents, which require original signatures and large format documents (greater than 8½ x 11 inches), all other 8½ x 11 inches documents shall be submitted by transmission in electronic form to the 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+)

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.

- 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

SECTION 013200 – SCHEDULE – BAR CHART

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

PART 2 - PRODUCTS – (Not Applicable)

PART 3 - EXECUTION

3.1 SUBMITTAL PROCEDURES

- A. The Contractor shall submit to the Designer, within ten (10) working days following the Notice to Proceed, a Progress Schedule including Schedule of Values showing the rate of progress the Contractor agrees to maintain and the order in which he proposed to carry out the various phases of Work. No payments shall be made to the Contractor until the Progress Schedule has been approved by the Owner.
 - 1. The Schedule of Values must have the following line items included with the value of the item as indicated below:
 - a. O&M's (Owner's Manual)
 - 1) \$1,000,000.00 (One million) and under – 2% of the total contract amount
 - 2) Over \$1,000,000.00 (One million) – 1% of the total contract amount
 - b. Close Out Documents
 - 1) \$1,000,000.00 (One million) and under – 2% of the total contract amount
 - 2) Over \$1,000,000.00 (One million) – 1% of the total contract amount
 - c. General Conditions
 - 1) No more than 10%
- B. The Contractor shall submit an updated Schedule for presentation at each Monthly Progress Meeting. The Schedule shall be updated by the Contractor as necessary to reflect the current Schedule and its relationship to the original Schedule. The updated Schedule shall reflect any changes in the logic, sequence, durations, or completion date. Payments to the Contractor shall be suspended if the Progress Schedule is not adequately updated to reflect actual conditions.

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

3.2 CONSTRUCTION PROGRESS SCHEDULE – BAR CHART SCHEDULE

- A. Bar-Chart Schedule: The Contractor shall prepare a comprehensive, fully developed, horizontal bar chart-type Contractor’s Construction Schedule. The Contractor for general construction shall prepare the Construction Schedule for the entire Project. The Schedule shall show the percentage of work to be completed at any time, anticipated monthly payments by Owner, as well as significant dates (such as completion of excavation, concrete foundation work, underground lines, superstructure, rough-ins, enclosure, hanging of fixtures, etc.) which shall serve as check points to determine compliance with the approved Schedule. The Schedule shall also include an activity for the number of “bad” weather days specified in Section 012100 – Allowances.
 - 1. The Contractor shall provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week.
 - a. If practical, use the same Schedule of Values breakdown for schedule time bars.
 - 2. The Contractor shall provide a base activity time bar showing duration for each construction activity. Each bar is to indicate start and completion dates for the activity. The Contractor is to place a contrasting bar below each original schedule activity time for indicating actual progress and planned remaining duration for the activity.
 - 3. The Contractor shall prepare the Schedule on a minimal number of separate sheets to readily show the data for the entire construction period.
 - 4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on schedule with other construction activities. Include minor elements involved in the overall sequence of the Work. Show each activity in proper sequence. Indicate graphically the sequences necessary for completion of related portions of the Work.
 - 5. Coordinate the Contractor’s Construction Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other required schedules and reports.
 - 6. Indicate the Intent to Award and the Contract Substantial Completion dates on the schedule.
- B. Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by the following:
 - 1. Requirement for Phased completion
 - 2. Work by separate Contractors
 - 3. Work by the Owner
 - 4. Pre-purchased materials
 - 5. Coordination with existing construction
 - 6. Limitations of continued occupancies

7. Un-interruptible services
 8. Partial Occupancy prior to Substantial Completion
 9. Site restrictions
 10. Provisions for future construction
 11. Seasonal variations
 12. Environmental control
- C. Work Stages: Use crosshatched bars to indicate important stages of construction for each major portion of the Work. Such stages include, but are not necessarily limited to, the following:
1. Subcontract awards
 2. Submittals
 3. Purchases
 4. Mockups
 5. Fabrication
 6. Sample testing
 7. Deliveries
 8. Installation
 9. Testing
 10. Adjusting
 11. Curing
 12. Startup and placement into final use and operation
- D. Area Separations: Provide a separate time bar to identify each major area of construction for each major portion of the Work. For the purposes of this Article, a “major area” is a story of construction, a separate building, or a similar significant construction element.
1. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure
 - c. Completion of mechanical installation
 - d. Completion of the electrical portion of the Work
 - e. Substantial Completion

3.3 SCHEDULE OF SUBMITTALS

- A. Upon acceptance of the Construction Progress Schedule, prepare and submit a complete schedule of submittals. Coordinate the submittal schedule with Section 013300 SUBMITTALS, the approved Construction Progress Schedule, list of subcontracts, Schedule of Values and the list of products.
- B. Prepare the schedule in chronological order. Provide the following information

1. Scheduled date for the first submittal
 2. Related Section number
 3. Submittal category
 4. Name of the Subcontractor
 5. Description of the part of the Work covered
 6. Scheduled date for resubmittal
 7. Scheduled date for the Designer's final release or approval
- C. Distribution: Following the Designer's response to the initial submittal schedule, print and distribute copies to the Designer, Owner, subcontractors, and other parties required to comply with submittal dates indicated.
1. Post copies in the Project meeting room and temporary field office.
 2. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned part of the Work and are no longer involved in construction activities.
- D. Schedule Updating: Revise the schedule after each meeting or other activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

3.4 SCHEDULE OF INSPECTIONS AND TESTS

- A. Prepare a schedule of inspections, tests, and similar services required by the Contract Documents. Submit the schedule with (15) days of the date established for commencement of the Contract Work. The Contractor is to notify the testing agency at least (5) working days in advance of the required tests unless otherwise specified.
- B. Form: This schedule shall be in tabular form and shall include, but not be limited to, the following:
1. Specification Section number
 2. Description of the test
 3. Identification of applicable standards
 4. Identification of test methods
 5. Number of tests required
 6. Time schedule or time span for tests
 7. Entity responsible for performing tests
 8. Requirements for taking samples
 9. Unique characteristics of each service
- C. Distribution: Distribute the schedule to the Owner, Architect, and each party involved in performance of portions of the Work where inspections and tests are required.

END OF SECTION 013200

SECTION 013300 – SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract including General and Supplementary Conditions, Bid Form, and other Division 1 Specification Sections apply to this Section.
- B. Division 1, Section 013115 “Project Management Communications” for administrative requirements for communications.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submittals required for performance of the Work including the following:
 - 1. Shop Drawings
 - 2. Product Data
 - 3. Samples
 - 4. Quality Assurance Submittals
 - 5. Construction Photographs
 - 6. Operating and Maintenance Manuals
 - 7. Warranties
- B. Administrative Submittals: Refer to General and Supplementary Conditions other applicable Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:
 - 1. Construction Progress Schedule including Schedule of Values
 - 2. Performance and Payment Bonds
 - 3. Insurance Certificates
 - 4. Applications for Payment
 - 5. Certified Payroll Reports
 - 6. Partial and Final Receipt of Payment and Release Forms
 - 7. Affidavit – Compliance with Prevailing Wage Law
 - 8. Record Drawings
 - 9. Notifications, Permits, etc.
- C. The Contractor is obliged and responsible to check all shop drawings and schedules to assure compliance with contract plans and specifications. The Contractor is responsible for the content of the shop drawings and coordination with other contract work. Shop drawings and schedules shall indicate, in detail, all parts of an Item or Work including erection and setting instructions and integration with the Work of other trades.
- D. The Contractor shall at all times make a copy of all approved submittals, available on site to the Construction Representative.

1.3 SUBMITTAL PROCEDURES

- A. The Contractor shall comply with the General and Supplementary Conditions and other applicable sections of the Contract Documents. The Contractor shall submit, with such promptness as to cause no delay in his work or in that of any other contractors, all required submittals indicated in Part 3.1 of this section and elsewhere in the Contract Documents. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Designer reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

- B. Each drawing and/or series of drawings submitted must be accompanied by a letter of transmittal giving a list of the titles and numbers of the drawings. Each series shall be numbered consecutively for ready reference and each drawing shall be marked with the following information:
 - 1. Date of Submission
 - 2. Name of Project
 - 3. Location
 - 4. Section Number of Specification
 - 5. State Project Number
 - 6. Name of Submitting Contractor
 - 7. Name of Subcontractor
 - 8. Indicate if Item is submitted as specified or as a substitution

1.4 SHOP DRAWINGS

- A. Comply with the General Conditions, Article 3.2.

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

- C. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings including the following information:
 - 1. Dimensions
 - 2. Identification of products and materials included by sheet and detail number
 - 3. Compliance with specified standards

4. Notation of coordination requirements
5. Notation of dimensions established by field measurement
6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8½"x11" but no larger than 36"x48".

1.5 PRODUCT DATA

- A. The Contractor shall comply with the General Conditions, Article 3.2.
- B. The Contractor shall collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.
 1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information including the following information:
 - a. Manufacturer's printed recommendations
 - b. Compliance with Trade Association standards
 - c. Compliance with recognized Testing Agency standards
 - d. Application of Testing Agency labels and seals
 - e. Notation of dimensions verified by field measurement
 - f. Notation of coordination requirements
 2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

1.6 SAMPLES

- A. The Contractor shall comply with the General Conditions, Article 3.2.
- B. The Contractor shall submit full-size, fully fabricated samples, cured and finished as specified, and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
 1. The Contractor shall mount or display samples in the manner to facilitate review of qualities indicated. Prepare samples to match the Designer's sample including the following:
 - a. Specification Section number and reference
 - b. Generic description of the Sample
 - c. Sample source
 - d. Product name or name of the Manufacturer
 - e. Compliance with recognized standards
 - f. Availability and delivery time
 2. The Contractor shall submit samples for review of size, kind, color, pattern, and texture. Submit samples for a final check of these characteristics with other

elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

- a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least three (3) multiple units that show approximate limits of the variations.
 - b. Refer to other Specification Sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
 - c. Refer to other Sections for samples to be returned to the Contractor for incorporation in the Work. Such samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of sample submittals.
 - d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.
3. Field samples are full-size examples erected onsite to illustrate finishes, coatings, or finish materials and to establish the Project standard.
- a. The Contractor shall comply with submittal requirements to the fullest extent possible. The Contractor shall process transmittal forms to provide a record of activity.

1.7 QUALITY ASSURANCE DOCUMENTS

- A. The Contractor shall comply with the General Conditions, Article 3.2
- B. The Contractor shall submit quality control submittals including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.
- C. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the Manufacturer certifying compliance with specified requirements.
 1. Signature: Certification shall be signed by an officer of the Manufacturer or other individual authorized to contractually bind the Company.
- D. Inspection and Test Reports: The Contractor shall submit the required inspection and test reports from independent testing agencies as specified in this Section and in other Sections of the Contract Documents.
- E. Construction Photographs: The Contractor shall submit record construction photographs as specified in this Section and in other Sections of the Contract Documents.
 1. The Contractor shall submit digital photographs. The Construction Administrator shall determine the quantity and naming convention at the preconstruction meeting.
 2. The Contractor shall identify each photograph with project name, location, number, date, time, and orientation.
 3. The Contractor shall submit progress photographs monthly unless specified otherwise. Photographs shall be taken one (1) week prior to submitting.

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

1.8 OPERATING AND MAINTENANCE MANUALS AND WARRANTIES

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

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 REQUIRED SUBMITTALS

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

SPEC SECTION	TITLE	CATEGORY
013100	Coordination Drawings	Shop Drawings
013100	List of Key Personnel Names	Certification
013200	Schedule of Values	Schedule of Values
013200	Construction Progress Schedule	Construction Schedule
013300	Construction Digital Photographs	Certification
013513.28	Materials Safety Data Sheets	Product Data
013513.28	Schedule of Proposed Shutdowns	Construction Schedule
013513.28	List of Employees Who Will Submit Fingerprint Background Checks	Certification
013513.28	MO Applicant Fingerprint Privacy Notice	Certification
013513.28	Applicant Privacy Rights (Signed)	Certification
013513.28	Privacy Act Statement (Signed)	Certification
024119	Pre-Demolition Photographs	Certification
024119	Landfill Records	Certification
033000	Cast-In-Place Concrete	Product Data
	Concrete Reinforcing	Test Report Shop Drawings
040513	Masonry Mortar	Product Data
042000	Face Brick	Product Data Mock up
042200	Concrete Unit Masonry	Product Data

	Masonry Reinforcing	Certification Shop Drawings
051200	Structural Steel Framing	Certification Shop Drawings
053123	Steel Roof Decking	Product Data Shop Drawings Warranty
054000	Cold Formed Metal Framing	Product Data Shop Drawings
061053	Rough Carpentry	Product Data
066100	Cast Polymer Fabrications	Product Data Shop Drawings
072113	Foam Board Insulation	Product Data
075423	TPO Roofing	Product Data Shop Drawings Warranty
075423	TPO Roofing- Installer's Warranty	Warranty
076200	Sheet Metal Flashing & Trim	Product Data Sample Shop Drawings
077100	Roof Specialties	Product Data Sample Shop Drawings
079200	Joint Sealants	Product Data Warranty
081113	Hollow Metal Doors & Frames	Product Data
081213	Hollow Metal Frames	Product Data
081416	Flush Wood Doors	Product Data
084113	Aluminum Entrances & Storefronts	Product Data Shop Drawings
087100	Door Hardware	Product Data
092900	Gypsum Board	Product Data
095100	Acoustical Ceilings	Product Data
099000	Painting & Coating	Product Data Sample

101423	Signage & Graphics	Product Data
142400	Hydraulic Passenger Elevator	Product Data Shop Drawings Sample
	Hydraulic Elevator - Service Agreement	Certification Operation / Maintenance Manual
220000	Plumbing	Product Data Operation / Maintenance Manual
230000	Mechanical	Product Data Certification Operation/Maintenance Manual Warranty
260000	Electrical	Product Data Certification
284600	Fire Detection & Alarm	Shop Drawings Test Report Operation/Maintenance Manual

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.

3.5 PROTECTION OF PERSONS AND PROPERTY

A. SAFETY PRECAUTIONS AND PROGRAMS

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

B. SAFETY OF PERSONS AND PROPERTY

1. The Contractor shall take reasonable precautions for safety of, and shall provide protection to prevent damage, injury, or loss to:
 - a. clients, staff, the public, construction personnel, and other persons who may be affected thereby;
 - b. the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor or the Contractor's Subcontractors of any tier; and
 - c. other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks,

pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

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

- and authority granted the Owner in the Contract Documents.
12. The Contractor shall maintain at his own cost and expense, adequate, safe and sufficient walkways, platforms, scaffolds, ladders, hoists and all necessary, proper, and adequate equipment, apparatus, and appliances useful in carrying on the Work and which are necessary to make the place of Work safe and free from avoidable danger for clients, staff, the public and construction personnel, and as may be required by safety provisions of applicable laws, ordinances, rules regulations and building and construction codes.

END OF SECTION 013513.28

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. Temporary heat
 - 2. Ventilation
 - 3. Sanitary facilities, including drinking water
- C. Support facilities include, but are not limited to, the following:
 - 1. Field offices and storage sheds
 - 2. Temporary enclosures
 - 3. Waste disposal services
- 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 (Not Used)

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. 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.

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 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.

- H. 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 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.
- D. Temporary Heating and Cooling: The normal heating and/or cooling system of the building shall be maintained in operation during the construction. Should the Contractor find it necessary to interrupt the normal HVAC service to spaces, which have not been vacated for construction, such interruptions shall be pre-scheduled with the Construction Representative.

- E. Temporary Toilets: Install self-contained toilet units. Use of pit-type privies will not be permitted. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
 - 1. Shield toilets to ensure privacy.
 - 2. Provide separate facilities for male and female personnel.
 - 3. Provide toilet tissue materials for each facility.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: The Owner's Representative will address the Agency's policy and procedure for field offices, storage sheds, and other temporary construction and support facilities at the Pre-Bid Meeting.
- B. Construction Parking: The Owner's Representative will address the Agency's policy and procedure for parking at the Pre-Bid Meeting.
- C. 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.
- D. Project Identification and Temporary Signs: Prepare project identification and other signs of size indicated. Install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.
 - 1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.
 - 2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.
- E. 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.

- F. Daily Magnet Sweep: Contractor shall perform a magnet sweep around entire perimeter of any given roof/construction area at least once per day.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Temporary Fire Protection: 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”.
- B. 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.

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. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:

END OF SECTION 015000

SECTION 017400 – CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for cleaning during the Project.
- B. Environmental Requirements: Conduct cleaning and waste-disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.
 - 1. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
 - 2. Burning or burying of debris, rubbish, or other waste material on the premises is not permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

- A. General
 - 1. Retain all stored items in an orderly arrangement allowing maximum access, not impending drainage or traffic, and providing the required protection of materials.
 - 2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
 - 3. At least 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.
4. Daily, perform a magnet sweep around the entire perimeter of any given roof/construction area.

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. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of the construction period.
- D. 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 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 PRE-INSTALLATION MEETINGS

- A. Pre-demolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Pre-demolition Photographs or Video: Submit before Work begins. Refer to Submittal Chart in Section 013300 – Submittals.

1.5 CLOSEOUT SUBMITTALS

- A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 FIELD CONDITIONS

- A. Owner will occupy portions of buildings immediately adjacent to and below selective demolition areas. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.7 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary of Work."

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, roofs, or framing.
 5. Dispose of demolished items and materials promptly.
- B. Removed and Reinstalled Items:
 1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

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

END OF SECTION 024119

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Sections:
 - 1. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.
- C. Floor surface flatness and levelness measurements.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- D. Concrete Testing Service: Owner engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150 Type I/II, gray. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F or C.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C 33, graded.
 - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M and potable.

2.4 ADMIXTURES

- A. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 WATERSTOPS

- A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).
- B. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch (10 by 19 mm).

2.6 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.9 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 20 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in concrete, as required, for placement and workability.
- D. Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: As required by prints at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.50 – footings; 0.45 – all other mixes
 - 3. Slump Limit: 4 inches (125 mm) or 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
 - 4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
 - 5. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
 - a. Add water vapor reducing admixture per manufacturers specified dosage rate to ready mix truck at the batch plant, or jobsite before discharge, mix rapidly for 7 minutes. (Follow Manufacturer's Instructions).

2.10 FABRICATING REINFORCEMENT

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

2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
- E. Waterstops: Install in construction joints and at other joints indicated according to manufacturer's written instructions.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

- C. Cold-Weather Placement: Comply with ACI 306.1.
- D. Hot-Weather Placement: Comply with ACI 301.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 - 2. Finish and measure surface so gap at any point between concrete surface and an unveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch (3.2 mm) at the gymnasium floor and 1/4" (6.4mm) at all other locations.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.10 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.11 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 033000

SECTION 040513 MASONRY MORTAR

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Documents:
 - 1. Drawings and general provisions of the Subcontract apply to this Section.
 - 2. Review these documents for coordination with additional requirements and information that apply to work under this Section.
- B. Section Includes:
 - 1. Mortar and grout for unit masonry.
 - 2. Cast-in-place concrete.
- C. Related Sections:
 - 1. Division 1 "General Requirements."
 - 2. Section 042000 Face Brick
 - 3. Section 042200 Concrete Unit Masonry

1.2 REFERENCES

- A. General:
 - 1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
 - 2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
 - 3. Refer to Division 1 "General Requirements" for the list of applicable regulatory requirements.
- B. ASTM International:
 - 1. ASTM C5 Standard Specification for Quicklime for Structural Purposes
 - 2. ASTM C91 Standard Specification for Masonry Cement
 - 3. ASTM C94 / C94M Standard Specification for Ready-Mixed Concrete
 - 4. ASTM C144 Standard Specification for Aggregate for Masonry Mortar
 - 5. ASTM C150 Standard Specification for Portland Cement
 - 6. ASTM C207 Standard Specification for Hydrated Lime for Masonry Purposes
 - 7. ASTM C270 Standard Specification for Mortar for Unit Masonry
 - 8. ASTM C387 / C387M Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete
 - 9. ASTM C476 Standard Specification for Grout for Masonry

10. ASTM C780 Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry

1.3 SUBMITTALS

- A. Submit under provisions of Division 1 "General Requirements."
- B. Submit mortar and grout design mixes with admixture limitations sealed by a Civil Engineer registered in Missouri, and proposed methods for maintaining environmental conditions. Mix designs and methods for maintaining environmental conditions shall be submitted to the Architect at least ten (10) days prior to placing unit masonry.
- C. Submit manufacturer's installation instructions under provisions of Division 1 "General Requirements."

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: The source of supply of materials shall remain constant throughout the Work unless approved in writing by the Owner's Representative.
- B. MIX Testing:
 - 1. Testing of Mortar: An independent testing laboratory shall verify mix consistency by daily testing in accordance with ASTM C780. Test reports shall be submitted to the Architect for review under the provisions of Division 1 "General Requirements."
 - 2. Testing of Grout Mix: An independent testing laboratory shall verify the grout aggregate size daily and take four test cylinders of each day's grout mix and test grout mix cylinders at 7 and 28 days. Test reports shall be submitted to the Architect for review under the provisions of Division 1 "General Requirements."

1.5 PROJECT CONDITIONS

- A. Environmental Requirements: Maintain materials and surrounding air temperature to at least 50°F prior to, during, and 48 hours after completion of masonry work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. [Portland Cement: ASTM C 150, normal-Type I; gray color.
- B. Masonry Cement: ASTM C 270, Type S.
- C. Mortar Aggregate: ASTM C 144, standard masonry type; clean, dry, protected against dampness, freezing, and foreign matter.
- D. Hydrated Lime: ASTM C 207, Type S.
- E. Quicklime: ASTM C 5, non hydraulic type.
- F. Premix Mortar: ASTM C 387, using gray cement.
- G. Water: Clean and potable.

- H. Mortar Color: Mineral oxide pigment; color; selected by Owner's Representative from manufacturer's standard color range.

2.2 ADMIXTURES

- A. Plasticizers, accelerators, retardants, water repellent agents, or other admixtures are not recommended for mortar unless specifically required for this project.

2.3 MIXES

- A. Mortar for Loadbearing Walls and Partitions: ASTM C 270, Type S.
- B. Mortar for Non-loadbearing Walls and Partitions: ASTM C 270, Type S.
- C. Mortar for Reinforced Masonry: ASTM C 476, Type PL.
- D. Pointing Mortar: ASTM C 270, Type N; with maximum 2 percent ammonium stearate or calcium stearate by cement weight.
- E. Bond Beams and Lintels: 3000 psi inch strength at 28 days, 7 – 8 inches slump.
- F. Engineered Masonry: 3000 psi strength at 28 days; 7 – 8 inches slump.

2.4 MORTAR AND GROUT MIXING

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C 270 and C 476.
- B. Add mortar color and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
- C. Do not use antifreeze compounds to lower the freezing point of mortar or grout.
- D. If water is lost by evaporation, retemper within two (2) hours of mixing. Do not retemper mortar after two (2) hours of mixing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. After inspection of concrete grout spaces , plug cleanout holes with masonry units and brace against wet grout pressure.
- B. Install mortar and grout in accordance with Division 4.
- C. Work grout into cores and cavities to eliminate voids.
- D. Do not displace reinforcing steel when placing grout.
- E. Clean concrete grout spaces and masonry units of excess mortar and debris.

END OF SECTION 040513

SECTION 042000 - FACE BRICK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Architectural Face Brick
- B. Reinforcement and Anchorage
- C. Accessories:
 - 1. Expansion Joints
 - 2. Mortar
 - 3. Flashing
 - 4. Weeps

1.2 RELATED SECTIONS

- A. Section 033000 - Cast-in-Place Concrete.
- B. Section 040513 - Masonry Mortar
- C. Section 042200 – Concrete Unit Masonry.
- D. Section 076200 - Sheet Metal Flashing and Trim.

1.3 REFERENCES

- A. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- B. ASTM A 153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- C. ASTM A 1008 - Standard Specification for Steel Sheet, Cold-Rolled Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
- D. ASTM C 67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile. 9.
- E. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar.
- F. ASTM C 150 - Standard Specification for Portland Cement.
- G. ASTM C 207 - Standard Specification for Hydrated Lime for Masonry Purposes.
- H. ASTM C 216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
- I. ASTM C 270 - Standard Specification for Mortar for Unit Masonry.

- J. ASTM C 652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale).
- K. ASTM D 1056 - Standard Specification for Flexible Cellular Materials, Sponge or Expanded Rubber.
- L. Brick Industry Association (BIA) - Technical Note 20, Cleaning Brickwork.
- M. TMS 402 - Building Code Requirements for Masonry Structures.
- N. TMS 602 - Specification for Masonry Structures.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
- C. Selection Samples: For each finish product specified, two complete sets of brick samples showing range of color and texture to be expected.
- D. Verification Samples: For each finish product specified, two samples representing actual color and texture of the brick specified.
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Sourcing: All primary products specified in this section shall be supplied by a single manufacturer
- B. Manufacturer Qualifications: 10 years' experience manufacturing similar products and with production capability to meet the Project schedule.
- C. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same type and scope as specified.
- D. Test Reports:
 - 1. Testing and reports shall be completed by an independent laboratory.
 - 2. Test reports for each type of building and facing brick shall be submitted to the Architect for review.
 - 3. Test reports shall indicate:
 - a. Compressive strength.
 - b. 24 hour cold water absorption.
 - c. 5-hour boil absorption.
 - d. Saturation coefficient.

- e. Initial rate of absorption.
 - f. Efflorescence.
- E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
- 1. Finish areas designated by Architect.
 - 2. Do not begin installation of brickwork until the Architect approves the mock-up(s)
 - 3. Build as many mock-ups as required to obtain the Architect's acceptance. Remove unacceptable mock-ups from the site.
 - 4. Accepted mock-ups may remain as part of the completed work and will set the standard of acceptance for remaining work including bond, mortar, workmanship, appearance and project specific criteria indicated by the Architect.

1.6 PRE-INSTALLATION MEETING

- A. Convene at the Project site minimum two weeks prior to starting work of this section to discuss:
- 1. Method and sequence of masonry construction.
 - 2. Special masonry details.
 - 3. Standard of workmanship.
 - 4. Quality control requirements.
 - 5. Job organization.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store materials in the manufacturer's unopened packaging with manufacturer's identification and labels intact until ready for installation.
- B. Store materials to prevent damage due to moisture, contamination, breakage, chipping or other causes.
- C. Store materials on pallets or stable aggregate bed to reduce contamination and soiling. Cover with a non-staining waterproof membrane allowing for airflow around brick while protecting it from airborne contaminants and wind-borne dirt.

1.8 PROJECT CONDITIONS

- A. Follow hot weather and cold weather requirements in the masonry code and specifications, TMS 402 and TMS 602.
- B. Cold Weather Procedures:
- 1. Preparation:
 - a. If ice or snow has formed on the masonry bed, remove it by carefully applying heat not to exceed 120 degrees F until the surface is dry to the touch.
 - b. Remove any brick units or mortar that is frozen or damaged.

- c. When the clay masonry unit suction exceeds 30 grams per minute per 30 square inches, sprinkle with heated water as follows:
 - 1) When units are 32 degrees F or above, heat water to 70 degrees F or above.
 - 2) When units are below 32 degrees F, heat water to 130 degrees F or above.
- 2. Work in Progress:
 - a. Air temperature 40 degrees F to 32 degrees F:
 - 1) Heat sand or mixing water to produce mortar temperatures that match air temperature.
 - b. Air temperature 32 degrees F to 25 degrees F:
 - 1) Heat sand and mixing water to produce mortar temperatures between 40 degrees F and 120 degrees F.
 - 2) Maintain temperature of mortar on boards above freezing.
 - 3) Installation in colder air temperatures will require heat sources on the wall and the use of windbreaks or tents to create a controlled environment suitable for proper bonding and curing.
 - 3. Completed Work and Work Not in Progress:
 - a. Mean daily air temperature of 40 degrees F to 32 degrees F: Protect masonry from rain and snow for 24 hours by covering with a weather-resistive membrane.
 - b. Mean daily air temperature of 32 degrees F to 25 degrees F: Cover masonry with a weather-resistive membrane for 24 hours.
 - c. Mean daily air temperature of 25 degrees F to 20 degrees F: Cover masonry with insulating blankets for 24 hours.
- C. Hot Weather Procedures:
- 1. When ambient temperature exceeds 90 degrees F and wind exceeds 8 miles per hour:
 - a. Maintain temperature of mortar and grout between 70 degrees F and 120 degrees F.
 - b. Limit the spread of the mortar bed to 4 feet and place units within 1 minute of spreading mortar.
 - c. Control moisture evaporation in partially or newly completed walls by fog spraying with potable water, covering with opaque plastic or canvas or both.
 - 2. Protection of Work in Progress:
 - a. Covering:
 - 1) Cover tops of walls with a strong waterproof membrane at the end of each day or work shutdown. Extend the waterproof membrane cover a minimum of 24 inches down the side of each wall.
 - 2) Hold cover securely in place.
 - b. Load Application:
 - 1) Do not apply uniform floor or roof loading for at least 12 hours after

completing columns and walls.

- 2) Do not apply concentrated loads for at least 3 days after completing columns and walls.
- c. Staining:
- 1) Prevent grout and mortar from staining the face of masonry.
 - 2) Remove grout and mortar that comes in contact with masonry units immediately.
 - 3) Protect sills, ledges and projections from mortar droppings.
 - 4) Protect base of wall from rain-splashed mud and mortar splatter.
 - 5) Turn scaffold boards on edge when work is not in progress to lessen splattering.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
1. Acme Brick (brick.com).
 2. Glen-Gery Brick (glengery.com)
 3. Kansas Brick & Tile (cloudceramics.com)
 4. Approved equal.

2.2 FACE BRICK

- A. Face Brick complying with ASTM C 216.
1. Grade: SW.
 2. Type: FBX.
 3. Initial Rate of Absorption: Less than 30 g / 30 sq. in. per minute per ASTM C 67.
 4. Efflorescence: Rated "Not Effloresced" per ASTM C 67.
 5. Size: 3 5/8" depth x 2 1/4" high x 7 5/8" long (new brick shall match existing brick veneer in size, color, texture and coursing).
- B. Special shape face bricks shall be as detailed and at locations as indicated on the Drawings.
- C. Furnish special uncured face brick in locations where cores would be exposed in finish work.

2.3 REINFORCEMENT AND ANCHORS

- A. Steel Reinforcement:
1. Billet Steel Deformed Bars: ASTM A 615.
 2. Rail Steel Deformed Bars: ASTM A 996.
 3. Axle Steel Deformed Bars: ASTM A 996.

4. Epoxy Coated Steel Bars: ASTM A 775.
- B. Fabricated Steel Lintels: Requirements for loose steel lintels are specified in Section 05 50 00 - Metal Fabrications.
- C. Brick Anchors and Ties: Provide to sizes and types indicated on the Drawings.
 1. Corrugated Ties: ASTM A 1008, 20 gauge, galvanized in accordance with ASTM A 153, Class B-2.
 2. Joint Reinforcement: ASTM A 82, galvanized in accordance with ASTM A 153, Class B-2.
 3. Wire Wall Ties, ASTM A 82:
 - a. Galvanized in accordance with ASTM A 153, Class B-2.
 4. Dovetail Anchors, ASTM A 1008:
 - a. Galvanized in accordance with ASTM A 153, Class B-2.

2.4 ACCESSORIES

- A. Expansion Joints:
 1. Premolded Foam: ASTM D 1056, Type 2, Class A, Grade 1
 2. Neoprene: ASTM D 1056, Type 2, Class A, Grade 1.
 3. Sealant: Shall be in accordance with Section 07 90 00 - Joint Protection.
- B. Mortar: Mortar should be mixed by proportion according to ASTM C 270 for Type N mortar
 1. Portland Cement: ASTM C 150, Type I.
 2. Hydrated Lime: ASTM C 207, Type S.
 3. Sand: ASTM C 144.
 4. Water: Potable.
- C. Flashing: Build in all flashings which enter the masonry as the work progresses Flashing are specified in Section 07 62 00 - Sheet Metal Flashing and Trim.
- D. Weeps: Weeps are to be used in conjunction with flashing materials for proper functioning of the masonry wall drainage system. The specified weep material is:
 1. Cotton sash cord, 12 inches long with end laid in air cavity.
 2. Plastic tube, 1/4 inch minimum diameter.
 3. Plastic vents or cells.
 4. Aluminum vents or cells.
- E. Cleaners: Compatible with substrate and acceptable to masonry manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify items provided by other Sections of work are properly sized and located.
- C. Verify that built in items are in proper location, and ready for roughing into masonry work
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Remove mud, loose rust, ice and contaminants that may interfere with mortar-to-unit bonding or mortar-to-footing/brick ledge bonding.
- C. Furnish temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent support.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Coordinate with Work specified in Section - Air Barriers and Section 07 27 00 - Air Barriers Water Resistive Barriers.
- C. Coursing:
 - 1. Establish lines, levels, and coursing indicated. Protect from displacement.
 - 2. Maintain masonry courses to uniform dimension. Form vertical joints of uniform thickness.
 - 3. Lay brick units in bond indicated on the Drawings.
 - 4. Brick coursing shall align with the coursing on the existing building.
- D. Laying Clay Masonry Units:
 - 1. Lay brick making sure head joints and bed joints are full of mortar.
 - 2. Lay brick units plumb and true to line.
 - 3. Where fresh mortar joins partially set mortar, remove loose brick and mortar and lightly wet the exposed surface of set masonry.
 - 4. When adjustment must be made after mortar begins to harden, remove hardened mortar and replace it with fresh mortar.
 - 5. Remove excess mortar as Work progresses.
- E. Masonry Reinforcing and Anchors: Install as indicated and in accordance with the reinforcing manufacturer's requirements.
- F. Fabricated Steel Lintels: Install as indicated.
- G. Tooling and Pointing:

1. Tool mortar joints to shape(s) indicated on the Drawings.
2. Tool exposed joints when they are thumbprint hard.
3. Flush-cut all joints when they are not tooled.
4. When re-pointing a section in a wall, rake the mortar joints to a depth of not less than 1/2 inch. Fill the joint completely with pointing mortar and tool to match the surrounding masonry.

H. Flashing:

1. Build in all flashings that enter the masonry, as the work progresses. Install as indicated and as specified in Section 07 62 00 - Sheet Metal Flashing and Trim.
2. Remove any projections on the brick surface or mortar bed that might puncture the flashing material.
3. Place through-wall flashing on a bed of mortar so that the flashing projects 1/4 inch from wall face and forms a drip edge. Overlap flashing a minimum of 6 inches.
4. Cover flashing with mortar.

I. Weeps:

1. Install weeps in the head joints of the first brick course immediately above the through-wall flashing. Place weeps at not more than 24 inches on center horizontally.
2. Keep the air cavity free of mortar as much as possible.

J. Control And Expansion Joints:

1. Install control and expansion joints as indicated on Drawings.
2. Keep joints free of mortar and any debris that may hinder movement.
3. Install expansion joint material and finish the joint with a sealer.

3.4 CLEANING

- A. Cut out defective mortar joints and holes in exposed masonry and re-point with mortar.
- B. Clean a sample wall area. Do not proceed with cleaning without Architect's approval.
- C. Clean brick in accordance with BIA Technical Note Number 20 and the proprietary cleaning product manufacturer's recommendations.

3.5 PROTECTION

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

END OF SECTION 042000

SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Concrete masonry units (CMU's).
 2. Steel reinforcing bars.
 3. Masonry-cell insulation.

1.2 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
1. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength.
 2. Mortar Test (Property Specification): For each mix required, according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 3. Mortar Test (Property Specification): For each mix required, according to ASTM C 780 for compressive strength.
 4. Grout Test (Compressive Strength): For each mix required, according to ASTM C 1019.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
- C. Samples: For each type and color of exposed masonry unit and colored mortar.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of product indicated. For masonry units include data on material properties.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.

2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.5 QUALITY ASSURANCE

- A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- B. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
 1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches high by full thickness.

1.6 PROJECT CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

- A. Regional Materials: CMUs shall be manufactured within 500 miles of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
- B. Shapes: Provide shapes indicated and for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- C. Integral Water Repellent: Provide units made with liquid polymeric, integral water repellent admixture that does not reduce flexural bond strength for exposed units and where indicated.

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

- a. ACM Chemistries, Inc.; RainBloc.
- b. BASF Aktiengesellschaft; Rheopel Plus.
- c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block.
- d. Approved equal.

D. CMUs: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi.
2. Density Classification: Normal weight unless otherwise indicated.

2.3 CONCRETE AND MASONRY LINTELS

A. General: Provide one of the following:

B. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Section 033000 "Cast-in-Place Concrete," and with reinforcing bars indicated.

C. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout.

2.4 MORTAR AND GROUT MATERIALS

A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

C. Hydrated Lime: ASTM C 207, Type S.

D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

E. Masonry Cement: ASTM C 91.

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Capital Materials Corporation; Flamingo Color Masonry Cement.
- b. Cemex S.A.B. de C.V.; Citadel Type S or Dixie Type S.
- c. Essroc, Italcementi Group; Brixment or Velvet.
- d. Holcim (US) Inc.; Mortamix Masonry Cement, Rainbow Mortamix Custom Buff Masonry Cement, or White Mortamix Masonry Cement.

- e. Lafarge North America Inc.; Magnolia Masonry Cement, Lafarge Masonry Cement, or Trinity White Masonry Cement.
 - f. Lehigh Cement Company; Lehigh Masonry Cement or Lehigh White Masonry Cement.
 - g. National Cement Company, Inc.; Coosa Masonry Cement.
 - h. Approved equal.
- F. Mortar Cement: ASTM C 1329.
- 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Lafarge North America Inc.; Lafarge Mortar Cement or Magnolia Superbond Mortar Cement.
 - b. Approved equal.
- G. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
- 1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
 - a. Davis Colors; True Tone Mortar Colors.
 - b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
 - c. Solomon Colors, Inc.; SGS Mortar Colors.
 - d. Approved equal.
- H. Colored Cement Product: Packaged blend made from portland cement and hydrated lime or mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
- 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Colored Portland Cement-Lime Mix:
 - 1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
 - 2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
 - 3) Lafarge North America Inc.; Eaglebond Portland & Lime.
 - 4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
 - 5) Approved equal.
 - b. Colored Masonry Cement:
 - 1) Capital Materials Corporation; Flamingo Color Masonry Cement.
 - 2) Cemex S.A.B. de C.V.; Richcolor Masonry Cement.

- 3) Essroc, Italcementi Group; Brixment-in-Color.
- 4) Holcim (US) Inc.; Rainbow Mortamix Custom Color Masonry Cement.
- 5) Lafarge North America Inc.; U.S. Cement Custom Color Masonry Cement.
- 6) Lehigh Cement Company; Lehigh Custom Color Masonry Cement.
- 7) National Cement Company, Inc.; Coosa Masonry Cement.
- 8) Approved equal.

I. Aggregate for Mortar: ASTM C 144.

1. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
2. White-Mortar Aggregates: Natural white sand or crushed white stone.
3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

J. Aggregate for Grout: ASTM C 404.

K. Cold-Weather Admixture: Non-chloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Euclid Chemical Company (The); Accelguard 80.
 - b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.
 - c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.
 - d. Approved equal.

L. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs, containing integral water repellent by same manufacturer.

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ACM Chemistries, Inc.; RainBloc for Mortar.
 - b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
 - c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.
 - d. Approved equal.

M. Water: Potable.

2.5 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
1. Interior Walls: Hot-dip galvanized, carbon steel.
 2. Exterior Walls: Hot-dip galvanized, carbon Stainless steel.
 3. Wire Size for Side Rods: 0.187-inch diameter.
 4. Wire Size for Cross Rods: 0.187-inch diameter.
 5. Wire Size for Veneer Ties: 0.187-inch diameter.
 6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

2.6 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, hot-dip galvanized steel wire.
 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch- diameter, hot-dip galvanized steel wire.
- C. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from [0.075-inch- thick, steel sheet, galvanized after fabrication.
 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch- diameter, hot-dip galvanized steel wire.
 3. Corrugated Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.075-inch- thick, steel sheet, galvanized after fabrication with dovetail tabs for inserting into dovetail slots in concrete and sized to extend to within 1 inch of masonry face.
- D. Partition Top anchors: 0.105-inch- thick metal plate with 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- E. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M or Epoxy coating 0.020 inch thick.
- F. Anchor Bolts: Headed or L-shaped 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; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

2.7 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim and as follows:
1. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
 2. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
- B. Flexible Flashing: Use one of the following unless otherwise indicated:
1. Copper-Laminated Flashing: 7-oz./sq. ft. copper sheet bonded between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
 - a. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Advanced Building Products Inc.; Copper Fabric Flashing.
 - 2) Dayton Superior Corporation, Dur-O-Wal Division; Copper Fabric Thru-Wall Flashing.
 - 3) Hohmann & Barnard, Inc.; H & B C-Fab Flashing.
 - 4) Phoenix Building Products; Type FCC-Fabric Covered Copper.
 - 5) Sandell Manufacturing Co., Inc.; Copper Fabric Flashing.
 - 6) York Manufacturing, Inc.; Multi-Flash 500.
 - 7) Approved equal.
 2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.
 - a. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Advanced Building Products Inc.; Peel-N-Seal.
 - 2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
 - 3) Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier Thru-Wall Flashing.
 - 4) Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.

- 5) Grace Construction Products, W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
 - 6) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
 - 7) Hohmann & Barnard, Inc.; Textroflash.
 - 8) W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
 - 9) Polyguard Products, Inc.; Polyguard 300.
 - 10) Sandell Manufacturing Co., Inc.; Sando-Seal.
 - 11) Williams Products, Inc.; Everlastic MF-40.
 - 12) Approved equal.
3. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.
- a. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) DuPont; Thru-Wall Flashing.
 - 2) Hohmann & Barnard, Inc.; Flex-Flash.
 - 3) Hyload, Inc.; Hyload Cloaked Flashing System.
 - 4) Mortar Net USA, Ltd.; Total Flash.
 - 5) Approved equal.
4. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637, 0.040 inch thick.
- a. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Carlisle Coatings & Waterproofing; Pre-Kleened EPDM Thru-Wall Flashing.
 - 2) Firestone Specialty Products; FlashGuard.
 - 3) Heckmann Building Products Inc.; No. 81 EPDM Thru-Wall Flashing.
 - 4) Hohmann & Barnard, Inc.; Epra-Max EPDM Thru-Wall Flashing.
 - 5) Sandell Manufacturing Co., Inc.; EPDM Flashing.
 - 6) Approved equal.
- C. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from high-density polyethylene incorporating chemical stabilizers that prevent UV degradation. Cell flashing pans have integral weep spouts that are designed to be built into mortar bed joints and weep collected moisture to the exterior of CMU walls and that extend into the cell to prevent clogging with mortar.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Mortar Net USA, Ltd.; Blok-Flash.

- b. Approved equal.
- D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."
- E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene, urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or [PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

2.9 MASONRY-CELL INSULATION

- A. Loose-Granular Fill Insulation: Perlite complying with ASTM C 549, Type II (surface treated for water repellency and limited moisture absorption) or Type IV (surface treated for water repellency and to limit dust generation).
- B. Molded-Polystyrene Insulation Units: Rigid, cellular thermal insulation formed by the expansion of polystyrene-resin beads or granules in a closed mold to comply with ASTM C 578, Type I. Provide specially shaped units designed for installing in cores of masonry units.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Concrete Block Insulating Systems; Korfil.
 - b. Shelter Enterprises Inc.; Omni Core.
 - c. Approved equal.

2.10 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use portland cement-lime or mortar cement mortar unless otherwise indicated.
 - 3. For exterior masonry, use portland cement-lime or mortar cement mortar.

4. For reinforced masonry, use portland cement-lime or mortar cement mortar.
 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
1. For masonry below grade or in contact with earth, use Type S.
 2. For reinforced masonry, use Type S.
 3. For mortar parge coats, use Type S or Type N.
 4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
 5. For interior non-load-bearing partitions, Type O may be used instead of Type N.
- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
1. Pigments shall not exceed 10 percent of portland cement by weight.
 2. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
 3. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Decorative CMUs.
 - b. Pre-faced CMUs.
- E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
1. Application: Use colored aggregate mortar for exposed mortar joints with the following units:
 - a. Decorative CMUs.
 - b. Pre-faced CMUs.
- F. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi .
 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.2 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

- C. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.3 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 - 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.4 MASONRY-CELL INSULATION

- A. Pour granular insulation into cavities to fill void spaces. Maintain inspection ports to show presence of insulation at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of insulation to one story high, but not more than 20 feet.
- B. Install molded-polystyrene insulation units into masonry unit cells before laying units.

3.5 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.

2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.

3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
1. Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.7 FLASHING

- A. General: Install embedded flashing in masonry at lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 2. At lintels, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
 3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
 4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
- C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

3.8 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 60 inches.

3.9 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
- B. Inspections: Level 1 special inspections according to the "International Building Code."
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.10 PARGING

- A. Parge exterior faces of below-grade masonry walls, where indicated, in 2 uniform coats to a total thickness of 3/4 inch (19 mm).
- B. Use a steel-trowel finish to produce a smooth, flat, dense surface. Form a wash at top of parging and a cove at bottom.
- C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.11 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
 - 2. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.12 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes structural steel and grout.
- B. Related Sections:
 - 1. Division 1 requirements.

1.2 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
 - 1. Select and complete connections using schematic details indicated and AISC 360.
 - 2. Use LRFD; data are given at factored-load level.
- B. Moment Connections: Type PR, partially restrained.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer, fabricator, and testing agency.
- B. Welding certificates.
- C. Mill test reports for structural steel, including chemical and physical properties.
- D. Source quality-control reports.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 360.
 - 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- E. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
- F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.
- C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip zinc coating or mechanically deposited zinc coating.
 2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating, baked epoxy-coated finish.
- D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
1. Finish: Plain.
- E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- F. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
1. Configuration: Straight.
 2. Finish: Plain.
- G. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
1. Finish: Plain.
- H. Threaded Rods: ASTM A 36/A 36M.
1. Finish: Plain.
- I. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

2.3 PRIMER

- A. All anti-corrosive or anti-rust primers applied on-site shall comply with a VOC limit of 250 g/L.
- B. Primer: Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- C. Primer: SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer.
- D. Primer: Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.4 GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
- B. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 - 2. Surfaces to be field welded.
 - 3. Surfaces to be high-strength bolted with slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 - 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.8 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E 165.
 - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M[and AWS D1.8/D1.8M] for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION 051200

SECTION 053123 – STEEL ROOF DECKING

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Documents:
 - 1. Drawings and general provisions of the Contract apply to this Section.
 - 2. Review these documents for coordination with additional requirements and information that apply to work under this Section.
- B. Section Includes:
 - 1. Steel roof deck and accessories.
 - 2. Formed steel cant strips, eave strips, valley strips and closure strips.
 - 3. Framed openings up to 18 inches.
 - 4. Bearing plates and angles.
- C. Related Sections:
 - 1. Division 1 - General Requirements.

1.2 REFERENCES

- A. General:
 - 1. The following documents form part of the Specifications to the extent stated. Where differences exist between standards, the one affording the greatest protection shall apply.
 - 2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
- B. AISI - Specification for the Design of Cold-Formed Steel Structural Members
- C. ASTM International:
 - 1. ASTM A36 / A36M Standard Specification for Carbon Structural Steel
 - 2. ASTM A653 / A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - 3. ASTM A924 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
- D. AWS D1.1 - Structural Welding Code
- E. Steel Deck Institute (SDI) - Design Manual for Composite Decks, Form Decks, Roof Decks
- F. Factory Mutual FM4451 – Approval Standard for Factory Mutual Approval Inspection Procedure
- G. Underwriters' Laboratories (UL) - Fire Resistance Directory

- H. Steel Structures Painting Council (SSPC) – Systems and Specifications

1.3 SUBMITTALS

- A. Submit under provisions of Division 1 Section 013300 "Submittals".
- B. Shop drawings: Indicate decking plan, deck profile dimensions, supports, projections, openings, finishes, pertinent details, and accessories.
- C. Certificates are required which indicate the decking meets or exceeds specified requirements.
- D. Submit documentation that welders employed on the Work meet AWS qualifications.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Division 1 Section 011000 "Summary of Work".
- B. Store decking on wood sleepers with slope for positive drainage cut plastic wrappings to encourage ventilation.

PART 2 - PRODUCTS

2.1 MATERIALS

- 1. Approved manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - a. Inryco Inc.
 - b. Verco Decking, Inc.
 - c. Vulcraft Group.
 - d. Approved equal.
- B. Sheet steel shall conform to ASTM A653, Grade 33, structural quality, and be galvanized with a G90 coating; in accordance with ASTM A924 prime painted.
- C. Bearing angles shall be galvanized steel conforming to ASTM A 36.
- D. Bearing Angles: ASTM A 36 steel.
- E. Welding materials shall conform to AWS D1.1.
- F. Cell closures shall be closed cell foam rubber, 1-inch thick, profiled to decking.
- G. Accessories are to be the same material and finish as the decking and not less than 20 gauge (0.0358 inch) of required profiles and size.
- H. The primer and touch-up paint for painted deck shall be free of lead or zinc chromate. Galvanizing repair paint shall conform to SSPC 20 and result in a dry film containing 94 percent zinc dust by weight.

2.2 FABRICATION

- A. Metal decking shall be 22 gauge (0.0299 inch) - sheet steel (excluding finish), 1-1/2 inch high with fluted profile to SDI in 24 inch or 32 inch wide sheets. The decking will be multiple span with lapped joints.
- B. Cant strips of formed sheet steel shall be the same gauge as the decking with a 45 degree slope, a nominal height of 3-1/2 inches and a flange for attachment.
- G. Welding washers shall be uncoated mild steel, 3/4 inch outside diameter and 1/8 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions prior to starting work.

3.2 INSTALLATION

- A. Erect metal decking in accordance with SDI Design Manual for Composite Decks, Form Decks, Roof Decks. Provide welding in accordance with AWS D1.1.
- B. On steel support members provide at least 1-1/2 inch bearing. Align and level on supports.
- C. On masonry support surfaces provide at least 4 inches bearing. Align and level on supports.
- D. Mechanically fasten male/female side laps at 24 inches O.C. maximum. Weld deck to steel supports at the ends and on intermediate supports with fusion welds through weld washers at 12 inches O.C.
- E. Seal deck joints, laps, ends and penetrations with sealant.
- F. Reinforce deck openings from 6 to 18 inches in size with 2 inches by 2 inches by 1/4-inch steel angles. Place angles perpendicular to flutes, extend them at least two flutes each side of the opening and weld to the deck.
- G. Install 6-inch-wide sheet steel cover plates where deck changes direction. Spot weld in place 12 inches O.C. maximum.
- H. Position roof sump pans with flange bearing on top surface of deck. Weld at each deck flute.
- I. Place metal cant strips in position and weld to decking.
- J. Immediately after welding painted deck in place and removing slag, touch-up damaged surface coating with prime paint. Immediately after welding galvanized deck in place and removing slag, touch-up damaged surface coating with galvanizing repair paint.
- K. Equipment openings in roof deck shall only be cut immediately prior to placing equipment over the opening.
- L. Fire Watch: Contractor shall assign personnel to maintain surveillance of areas where hot work is being conducted per OSHA regulations.

END OF SECTION 053123

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Exterior non-load-bearing wall framing.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product and accessory indicated.
- B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification data.
- B. Welding certificates.
- C. Product test reports.
- D. Research/evaluation reports.

1.4 QUALITY ASSURANCE

- A. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements.
- B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code--Sheet Steel."
- C. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- D. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
 - 1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
 - 2. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."
- E. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.2 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated.
 - 2. Flange Width: As indicated (41 mm).
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and same minimum base-metal thickness as steel studs.
- C. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads.
- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

2.3 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members, unless otherwise indicated.
- B. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- C. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- D. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- E. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

- F. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.4 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Shims: Load bearing, high-density multi-monomer plastic, non-leaching.
- D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.2 INSTALLATION, GENERAL

- A. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- B. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
- C. Install framing members in one-piece lengths.
- D. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- E. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- F. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

- G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- H. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated.
 - 1. Stud Spacing: As indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deflection tracks and anchor to building structure.
 - 2. Install double deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to bypassing studs and anchor to primary building structure.
- E. Install horizontal bridging in wall studs, spaced in rows indicated on Drawings. Fasten at each stud intersection.
 - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches (305 mm) of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - a. Install solid blocking at centers indicated.
 - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - 4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtain-wall-framing system.

3.4 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Framing with dimension lumber.
 2. Rooftop equipment bases and support curbs.
 3. Wood blocking, cants, and nailers.
 4. 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.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber 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. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.
- C. Engineered Wood Products: Provide engineered wood products acceptable to the Designer 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, that 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. Plywood Products:
 - 1. Fir Plywood: U.S. Product Standard PS1 (latest edition), grade-stamped and edge branded to DFPA Standards of the American Plywood Association.
 - 2. Plywood: CDX (Exterior – Exposure 1), rated for 24-inch span, thickness as shown on Drawings.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWA U1; 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 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat all rough carpentry unless otherwise indicated.
 - 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 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 the Designer, 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 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 19 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. Concealed blocking.
 2. Roof construction.
 3. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

- A. Framing Other Than Non-Load-Bearing Interior Partitions: Construction or No. 2 grade.
 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.

2.5 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 Construction or No. 2 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 grade; WCLIB or WWPA.

2.6 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Exterior, C-C Plugged in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.7 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.
- 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.

2.8 METAL FRAMING ANCHORS

- A. 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.
- B. 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.
- C. 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 thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.

2.9 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch 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 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.

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 AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Shear Wall Panels: Install shear wall panels to comply with manufacturer's written instructions.
- E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with requirements for attaching other construction.

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.

C. END OF SECTION 061000

SECTION 066100 – CAST POLYMER FABRICATIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, conditions of the contract and Division 1 Specifications sections, apply to work of this section.

1.2 SUMMARY

- A. Section Includes: Architectural Fiberglass Reinforced Polymer (FRP) fabrications.
- B. “Missouri National Guard” medallion.

1.3 RELATED SECTIONS

- A. Section 06100 – Rough Carpentry: Framing of Opening and Blocking.
- B. Section 07900 - Joint sealants and field applied sealants.

1.4 DESIGN REQUIREMENTS

- A. Installed architectural fiberglass fabrications and fastening systems shall be designed, engineered, fabricated, and installed to comply with all applicable codes, ordinances, regulations, and the Architect’s design.

1.5 SUBMITTALS

- A. Shop Drawings: Shall illustrate dimensions, adjacent construction, materials, thickness, fabrications details, required clearances, field jointing, tolerances, colors, finishes, methods of support, attachments, anchorage to substrates, integration of components, and list of part numbers that coordinate with labeled architectural fiberglass parts.
- B. Product Data: Submit manufacturer’s product data and installation instructions.
- C. Product Samples: Submit minimum 3-inch x 5-inch samples in specified color, texture and finish when applicable.

1.6 QUALITY ASSURANCE

- A. Obtain architectural fiberglass from a single source manufacturer that has the ability and resources to comply with the requirements and schedule of the project.
- B. Manufacturer to comply with Quality Control & Assurance Procedures, and fabricate architectural fiberglass based upon provisions published in the “Guidelines and Recommended Practices for Fiberglass Reinforced Plastic Architectural Products”.
- C. Inspect each molded piece to ensure that it complies with specified requirements, including nominal dimensions.

1.7 MANUFACTURER'S QUALIFICATIONS

- A. Manufacturer: Provide products manufactured by a firm specializing in the manufacture of fiberglass architectural ornamentation, in the United States with a minimum of ten (10) years experience.
- B. Provide a list of projects comparable in size, scope, and complexity as indicated, upon request.
- C. Provide verification that architectural fiberglass meets or exceeds products specified.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Handle, store and transport architectural fiberglass fabrications according to manufacturer's recommendations and in a manner that prevents damage.
- B. Protect architectural fiberglass from damage by retaining shipping protection in place until installation.
- C. Damage Responsibility: Except for damage caused by others, the installer is responsible for chipping, cracking, or other damage to fiberglass fabrications, after delivery to the jobsite and until installation is completed and inspected and approved by the Architect or owner's representative.

1.9 WARRANTY

- A. Warrant architectural fiberglass fabrications to be free from defect due to materials and workmanship for one year.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work:
 - 1. Fibblast LLC. 334-513-1314 www.fibblast.com.
 - 2. Approved equal.

2.2 FABRICATION PATTERNS/MOLDS

- A. Custom Pattern/Mockups: Patterns and mockups shall be hand carved and/or CNC machined by skilled pattern makers with minimum of ten (10) years experience with architectural elements. Patterns & mockups shall be available at manufacturing facility for architect's inspection and approval before molds are produced.
- B. Custom Molds: Molds shall be produced with ample layers of tooling resin, tooling gel-coat, glass fibers and/or flexible rubber by skilled mold makers with minimum of ten (10)

years experience with architectural elements. Produced molds shall have rigidity and thickness to prevent distortion and deflection of molded architectural fiberglass.

2.3 MATERIALS CHARACTERISTICS

- A. MOLDED EXTERIOR SURFACE: U-V inhibited, NPG-ISO polyester gel coat, 18 to 22 mils thick. Color to match in texture and finish of sample supplied by Architect.
- B. BACK UP LAMINATE:
 - 1. Resin: Polyester resin shall be fire retardant and meet Class 1 flame spread rating of 25 or less and smoke density under 450 without the use of antimony trioxide as characterized by the ASTM E-84 tunnel test at typical 1/8" glass mat laminate. General Purpose resin will not be permitted.
 - 2. Filler: Functional filler to be added to resin matrix to minimize shrinkage, add stiffness, control opacity, add fire retardance, improve surface finish, minimize crazing, and control dimensional stability from weather extremes.
 - 3. Fiberglass Reinforcement: Type "E" fiberglass, glass cloth, matt and/or random chopped glass fibers. Glass content approximately 20% to 30%.
 - 4. Laminate Thickness: Nominal laminate shall be minimum 3/16" thickness. Additional core reinforcements and/or sandwich structure added as required for rigidity and structural integrity.

2.4 AVERAGE MECHANICAL PROPERTIES:

PROPERTY	VALUE	TEST METHOD
Tensile strength	12,000 PSI	ASTM D638
Flexural strength	20,000 PSI	ASTM D790
Flexural modulus	0.9 x 10 ⁶ PSI	ASTM D790
Compressive strength	17,000 PSI	ASTM D695
Bearing strength	9,000 PSI	ASTM D638
Thermal expansion	10 x 10 ⁻⁶ (□F)	
Specific gravity	1.5	

2.5 FINISH

- A. Color as selected by Architect or Owner's representative.
- B. Surface Texture/Exposed side shall be smooth or textured based upon approved sample.

2.6 TOLERANCES

- A. Part Thickness: + or - 1/8 inch.
- B. Gel Coat Thickness: + or - 2.5 mils.

- C. Length: + or – 1/8 inch
- D. Variation from Square: 1/8 inch.
- E. Hardware Location Variation: + or – ¼ inch.

2.7 IDENTIFICATION

- A. Identify each architectural fiberglass unit with a permanent serial number.
- B. Number parts to coordinate with shop drawings.

2.8 CURING AND CLEANING

- A. Cure and clean components prior to shipment and remove material which may be:
 - 1. Toxic to plant or animal life.
 - 2. Incompatible with adjacent building material.

2.9 ANCHORS AND FASTENERS

- A. Contractor to provide anchors and fasteners and other accessories for proper installation of architectural fiberglass fabrications as recommended and approved by fiberglass fabrication manufacturer.

PART 3 – EXECUTION

3.1 PRE-INSTALLATION EXAMINATION

- A. Carefully observe and verify field conditions that substrates are ready for installation of architectural fiberglass fabrications. Contractor shall verify on site dimensions with shop drawings and assume full responsibility for fitting the components to the structure.
- B. Verify that bearing surfaces are true and level.
- C. Verify that support framing has been constructed to allow accurate placement, alignment and connection of architectural fiberglass fabrications to structure.
- D. Report discrepancies between design dimensions and field dimensions, which could adversely affect installation, to the Architect and / or Owner's Representative.
- E. Do not proceed with installation until discrepancies are corrected, or until installation requirements are modified and approved by the Architect and / or Owner's Representative.
- F. Beginning of installation means acceptance of existing conditions and fiberglass materials.

3.2 INSTALLATION

- A. Install architectural fiberglass fabrications in accordance with manufacturer's instructions and approved shop drawings.

3.3 ALLOWABLE TOLERANCES FOR INSTALLED UNITS

- A. Maximum offset from True Alignment: 1/4 inch in 20 feet.
- B. Maximum Variation from True Position: 1/2 inch in 20 feet.

3.4 CLEANING

- A. Clean installed architectural fiberglass fabrications using cleaning methods and material approved by manufacturer.

3.5 PROTECTION OF INSTALLED FABRICATIONS

- A. Comply with manufacturer's recommendations and instructions for protecting installed fabrications during construction activities.

END OF SECTION 066100

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Foam-plastic board insulation.
 2. Glass-fiber board insulation.
 3. Mineral-wool board insulation.
 4. Glass-fiber blanket insulation.
 5. Mineral-wool blanket insulation.
 6. Loose-fill insulation.
 7. Spray-applied cellulosic insulation.
 8. Spray polyurethane foam insulation.
 9. Vapor retarders.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Research/evaluation reports.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning.
 - d. Pactiv Building Products.
 - e. Or approved equal.
 2. Type X, 15 psi.
 3. Type IV, 25 psi.

4. Type VI, 40 psi.
 5. Type VII, 60 psi.
 6. Type V, 100 psi.
- B. Molded-Polystyrene Board Insulation: ASTM C 578, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - a. DiversiFoam Products.
 - b. Plymouth Foam, Inc.
 - c. Or approved equal.
 2. Type I, 10 psi.
 3. Type II, 15 psi.
 4. Type VIII, 20 psi.

2.2 GLASS-FIBER BOARD INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
1. CertainTeed Corporation.
 2. Johns Manville.
 3. Knauf Insulation.
 4. Owens Corning.
 5. Or approved equal.
- B. Glass-Fiber Board Insulation: ASTM C 612, Type IA; unfaced, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
1. Nominal density of 2.25 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F.
 2. Nominal density of 3 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F.
 3. Nominal density of 4.25 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F.
 4. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), thermal resistivity of 4.4 deg F x h x sq. ft./Btu x in. at 75 deg F.

2.3 MINERAL-WOOL BOARD INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
1. Fibrex Insulations Inc.
 2. Isolatek International.

3. Owens Corning.
 4. Roxul Inc.
 5. Thermafiber.
 6. Or approved equal.
- B. Unfaced, Mineral-Wool Board Insulation: ASTM C 612; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
1. Nominal density of 4 lb/cu. ft., Types IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F.
 2. Nominal density of 6 lb/cu. ft., Type II, thermal resistivity of 4.16 deg F x h x sq. ft./Btu x in. at 75 deg F.
 3. Nominal density of 8 lb/cu. ft., Type III, thermal resistivity of 4.35 deg F x h x sq. ft./Btu x in. at 75 deg F.
 4. Fiber Color: Darkened, where indicated.
- C. Foil-Faced, Mineral-Wool Board Insulation: ASTM C 612; faced on one side with foil-scrim or foil-scrim-polyethylene vapor retarder; with maximum flame-spread and smoke-developed indexes of 25 and 5, respectively, per ASTM E 84.
1. Nominal density of 4 lb/cu. ft., Types IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F.
 2. Nominal density of 6 lb/cu. ft., Type II, thermal resistivity of 4.16 deg F x h x sq. ft./Btu x in. at 75 deg F.
 3. Nominal density of 8 lb/cu. ft., Type III, thermal resistivity of 4.35 deg F x h x sq. ft./Btu x in. at 75 deg F.

2.4 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
1. CertainTeed Corporation.
 2. Guardian Building Products, Inc.
 3. Johns Manville.
 4. Knauf Insulation.
 5. Owens Corning.
 6. Or approved equal.
- B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
- C. Polypropylene-Scrim-Kraft-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type II (non-reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier).

- D. Kraft-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type II (non-reflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).
- E. Reinforced-Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.
- F. Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class B (faced surface with a flame-propagation resistance of 0.12 W/sq. cm); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.
- G. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

2.5 MINERAL-WOOL BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 1. Fibrex Insulations Inc.
 2. Owens Corning.
 3. Roxul Inc.
 4. Thermafiber.
 5. Or approved equal.
- B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
- C. Reinforced-Foil-Faced, Mineral-Wool Blanket Insulation: ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less per ASTM E 84); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

2.6 LOOSE-FILL INSULATION

- A. Cellulosic-Fiber Loose-Fill Insulation: ASTM C 739, chemically treated for flame-resistance, processing, and handling characteristics.
- B. Glass-Fiber Loose-Fill Insulation: ASTM C 764, Type I for pneumatic application or Type II for poured application; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.

2.7 SPRAY-APPLIED CELLULOSIC INSULATION

- A. Self-Supported, Spray-Applied Cellulosic Insulation: ASTM C 1149, Type I (materials applied with liquid adhesive; suitable for either exposed or enclosed applications), Type II (materials containing a dry adhesive activated by water during installation; intended only for enclosed or covered applications), Type III (materials containing an adhesive mixed with water during

application; intended for application on attic floors, chemically treated for flame-resistance, processing, and handling characteristics.

2.8 SPRAY POLYURETHANE FOAM INSULATION

- A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
1. Manufacturers: Subject to compliance with requirements, 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:
 - a. BASF Corporation.
 - b. BaySystems NorthAmerica, LLC.
 - c. Dow Chemical Company (The).
 - d. ERSystems, Inc.
 - e. Gaco Western Inc.
 - f. Henry Company.
 - g. NCFI; Division of Barnhardt Mfg. Co.
 - h. SWD Urethane Company.
 - i. Volatile Free, Inc.
 - j. Or approved equal.
 2. Minimum density of 1.5 lb/cu. ft., thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F.
- B. Open-Cell Polyurethane Foam Insulation: Spray-applied polyurethane foam using water as a blowing agent, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
1. Manufacturers: Subject to compliance with requirements, 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:
 - a. BaySystems NorthAmerica, LLC.
 - b. Demilec (USA) LLC.
 - c. Gaco Western Inc.
 - d. Icynene Inc.
 - e. SWD Urethane Company.
 - f. Or approved equal.
 2. Minimum density of 0.4 lb/cu. ft., thermal resistivity of 3.4 deg F x h x sq. ft./Btu x in. at 75 deg F.

2.9 VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.

- B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF BELOW-GRADE INSULATION

- A. On vertical surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
 - 1. If not otherwise indicated, extend insulation a minimum of 36 inches below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 - 1. If not otherwise indicated, extend insulation a minimum of 36 inches in from exterior walls.

3.3 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
 - 1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

3.4 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in

completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

- C. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
 6. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:
 - a. With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.
 - b. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
 7. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
 - a. Exterior Walls: Set units with facing placed toward interior of construction.
 - b. Interior Walls: Set units with facing placed as indicated on Drawings.
- D. Loose-Fill Insulation: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
1. For cellulosic-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."
- E. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.
- F. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.
 2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.5 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

- A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
 - 1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
 - 2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
 - 3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
 - 4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.6 INSTALLATION OF CURTAIN-WALL INSULATION

- A. Install board insulation in curtain-wall construction where indicated on Drawings according to curtain-wall manufacturer's written instructions.
 - 1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated between insulation and glass.
 - 2. Install insulation where it contacts perimeter fire-containment system to prevent insulation from bowing under pressure from perimeter fire-containment system.

3.7 INSTALLATION OF VAPOR RETARDERS

- A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.
 - 1. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.
 - 2. Before installing vapor retarders, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
 - 3. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.
- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

END OF SECTION 072100

SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Thermoplastic Polyolefin (TPO) roofing membrane system.

1.2 PERFORMANCE REQUIREMENTS

- A. Solar Reflectance Index: Not less than 78 (initial value) when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. The roofing system manufacturer shall submit with shop drawings a written confirmation that all roofing components, exclusive of the roof deck, contained in the roofing 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 the project if the system is installed as designed.
- C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
- D. Samples for Verification: For the following products:
 - 1. Sheet roofing, color White.

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Submit evidence of compliance with performance requirements.
- B. Research/evaluation reports.
- C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product.

- B. Source Limitations: Obtain components including roof insulation and fasteners for membrane roofing system approved by membrane roofing manufacturer.
- C. Exterior Fire-Test Exposure: ASTM E 108, Class C; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
- D. Pre-installation Roofing Conference: Conduct conference at Project site.
- E. Field Quality Control: Comply with all applicable provisions of Section 075423 Part 3.5.

1.7 WARRANTY

- A. Roofing Manufacturer's Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.
 - 2. The roofing manufacturer's warranty shall be executed by both the roofing system manufacturer and the roofing contractor.
- B. Roofing Installer's Warranty: The Contractor shall submit an executed copy of the Roofing Installer's Warranty covering insulation, fasteners, vapor retarders, membrane roofing, base flashing, penetrations, curbs, accessories, etc. for a warranty period of two (2) years from the Date of Substantial Completion. Refer to Appendix B – Roofing Installer's Warranty Form.

PART 2 - PRODUCTS

2.1 TPO MEMBRANE ROOFING

- A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible TPO sheet.
 - 1. Manufacturers: Subject to compliance with requirements, 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:
 - a. Carlisle SynTec Incorporated.
 - b. Firestone Building Products Company.
 - c. Versico Incorporated.
 - 2. Thickness: 60 mils, nominal.
 - 3. Color: White (minimum initial solar reflectance value of 0.78)

2.2 AUXILIARY MEMBRANE ROOFING MATERIALS

- A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
 - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Plastic Foam Adhesives: 50 g/L.
 - b. Gypsum Board and Panel Adhesives: 50 g/L.
 - c. Multipurpose Construction Adhesives: 70 g/L.
 - d. Fiberglass Adhesives: 80 g/L.
 - e. Single-Ply Roof Membrane Adhesives: 250 g/L.
 - f. Other Adhesives: 250 g/L.
 - g. Single-Ply Roof Membrane Sealants: 450 g/L.
 - h. Nonmembrane Roof Sealants: 300 g/L.
 - i. Sealant Primers for Nonporous Substrates: 250 g/L.
 - j. Sealant Primers for Porous Substrates: 775 g/L.
- B. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, 55 mils thick, minimum, of same color as sheet membrane.
- C. Bonding Adhesive: Manufacturer's standard.
- D. Slip Sheet: Manufacturer's standard, of thickness required for application.
- E. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 inch wide by 1/8-inch thick; with anchors.
- F. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05-inch thick, pre-punched.
- G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.3 ROOF INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 (20 psi) with felt or glass-fiber mat facer on both major surfaces. Mechanically-fasten insulation system to substrate in compliance with requirements of FM 1A-90.
- B. Tapered Insulation: Provide factory-tapered insulation boards fabricated to achieve an overall roof slope greater than or equal to ¼ inch per 12 inches. Mechanically-fasten tapered insulation to substrate in compliance with requirements of FM 1A-90.
- C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated and required to achieve a minimum overall roof slope of ¼ inch per 12 inches to

drain. Fabricate to slopes indicated in approved shop drawings. Mechanically-fasten insulation shapes to substrate in compliance with requirements of FM 1A-90.

2.4 INSULATION ACCESSORIES

- A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.
- B. Insulation Adhesive: Insulation manufacturer's recommended cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- C. Cover Board: ASTM C 1289, Type II, Class 4, Grade 1 (80 psi), high-density polyisocyanurate insulation cover board with glass-mat facers, **1/2 inch** thick. Mechanically-fasten cover board system to substrate in compliance with requirements of FM 1A-90.

PART 3 - EXECUTION

3.1 SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows a minimum of 6 inches. Tightly butt substrate boards together.
 - 1. Fasten substrate board to deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions for compliance with requirements of FM 1A-90.

3.2 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system and insulation system manufacturer's written installation instructions for compliance with the requirements of FM 1A-90.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- E. Mechanically Fastened Insulation: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to roof deck type. Fasten each layer of insulation to resist uplift pressure a corners, perimeter, and field of roof in compliance with membrane roofing system and cover board system manufacturer's written installation instructions for compliance with the requirements of FM 1A-90.
- F. Install cover boards over insulation in insulation with long joints in continuous straight lines with end joints staggered between rows. Offset coverboard joints from joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together. Comply

with membrane roofing system and cover board system manufacturer's written installation instructions for compliance with the requirements of FM 1A-90.

3.3 ADHERED MEMBRANE ROOFING INSTALLATION

- A. Adhere membrane roofing over area to receive roofing and install according to membrane roofing system manufacturer's written instructions.
- B. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- C. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.
- D. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing.
- E. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
- F. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - 2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

3.4 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Extend membrane flashing up and over the top of parapets, curbs, expansion joints and other similar features, extending a minimum of 3 inches down the opposite vertical face. Terminate membrane flashing under anchor bars, termination bars, or other types of fasteners in compliance with the membrane roofing system manufacturer's written installation instructions.

3.5 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

- B. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
- C. Defective or nonconforming conditions requiring repair or removal and replacement are defined as follows, unless more stringent criteria are required by the roofing system manufacturer:
 - 1. Blister, Bubble, Capillaries or Voids: A spongy raised portion of the roofing membrane resulting from improper surface preparation, pressure of entrapped air, entrapped water vapor, inadequate adhesive, adhesive bonding failure, improper attachment method, or resulting from climatic conditions at the time of installation. Individual conditions shall not exceed four (4) inches in diameter, multiple occurrences shall not be spaced less than forty-eight (48) inches on center, nor shall multiple occurrences exceed sixteen (16) square inches within one hundred forty-four (144) square feet of surface area.
 - 2. Fishmouth: Opening or void in lapped edge or seam.
 - 3. Punctures or Holes: Condition compromising the watertightness of the roofing system.
 - 4. Seam or Joint Separation: Unbonded edge condition where probing tool penetrates lapped area under firm pressure.
 - 5. Slope, Drainage or Ponding: No roof surface shall retain or pond water forty-eight (48) hours after a precipitation event where climatic conditions are conducive to drying.
 - 6. Wrinkles or Distortions: Surface conditions that impede the proper drainage of water. Insulation and cover board joints shall not exceed ¼-inch wide or exceed ¼-inch vertical offset.
 - 7. The contractor shall pay all costs for additional inspections required to verify that repairs or replacements are in compliance with these provisions.

END OF SECTION 075423

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 077100 Roof Specialties.

1.2 SUMMARY

- A. This Section includes the following sheet metal flashing and trim:
 - 1. Roof flashing, counterflashing, reglets.
 - 2. Gutters, downspouts, scuppers.
 - 3. Formed coping and trim.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- C. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identify material, thickness, weight, and finish for each item and location in Project.
 - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 - 3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.

4. Details of expansion-joint covers, including showing direction of expansion and contraction.
- C. Samples for Initial Selection: For each type of sheet metal flashing and trim indicated with factory-applied color finishes.
1. Include similar Samples of trim and accessories involving color selection.

1.5 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- B. Installer Qualifications: Engage an experienced Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.7 COORDINATION

- A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.
- B. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified in Part 2.2 (below).

2.2 SHEET METALS

- A. Aluminum-Zinc Alloy-Coated Steel Sheet (Galvalume): For unexposed flashings, cleats, clips, etc., ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality with manufacturer's standard clear acrylic coating both sides.
- B. Steel Sheet: ASTM A 240/A 240M, Type 304.
 - 1. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick.
- C. Organic Coating Finish: Apply the following system by coil-coating process on galvalume steel sheet as recommended by coating manufacturers and applicator.
 - 1. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.
 - a. Color and Gloss: As selected by Architect from manufacturer's full range of choices for color and gloss.
 - b. Resin Manufacturers: Subject to compliance with requirements, provide fluoropolymer coating systems containing resins produced by one of the following manufacturers:
 - 1) Ausimont USA, Inc. (Hylar 5000)
 - 2) AtoFina Chemicals, Inc. (Kynar 500)
 - 3) Arkema Group (Kynar 500)
 - 4) An Acceptable Substitution which meets the requirements of these specifications per the three manufacturers listed above.
 - 2. Coil-Coated Steel Sheet Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - a. Atlas Aluminum Corporation.
 - b. Berridge Manufacturing Company.
 - c. Firestone Una-Clad.
 - d. Copper Sales, Inc.
 - e. MM Systems Corporation.
 - f. Petersen Aluminum Corporation.
 - g. Vincent Metals.
- D. Shop Finish, Rain Drainage: Provide manufacturer's standard baked-on, acrylic shop finish on sheet metal flashing and trim; 1.0-mil dry film thickness. Color as selected by Architect from manufacturer's full range of choices for color and gloss.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 - 1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
 - 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
 - 3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
- C. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane, polysulfide or silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.
- G. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.
- H. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.

2.4 FABRICATION, GENERAL

- A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
- B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
- D. Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
- E. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

- F. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- G. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
- H. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
- I. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
 - 1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.5 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
 - 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: As otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.
- B. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective

coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Torch cutting of sheet metal flashing and trim is not permitted.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
1. Coat side of uncoated aluminum or stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
 3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- D. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- E. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric or butyl sealant.
- F. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
1. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
- G. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric or butyl sealant concealed within joints.
- H. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
1. Galvanized or Prepainted, Metallic-Coated Steel: Use stainless-steel fasteners.
 2. Stainless Steel: Use stainless-steel fasteners.
- I. Seal joints with elastomeric or butyl sealant as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

- J. Soldered Joints:
 - 1. Do not solder prepainted, metallic-coated steel sheet.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Downspouts: Join sections with 1-1/2 inch telescoping joints. Provide 1-1/2 inch wide hangers designed to hold downspouts securely 1 inch away from walls; locate hangers 12" from top and bottom and at approximately 60 inches o.c. in between, and a minimum of three hangers per downspout.
 - 1. Provide elbows at base of downspout to direct water away from building.
 - 2. Provide concrete splashblocks at base of downspouts to direct water away from building as indicated at locations where downspouts are not provided.
- C. Conductor Heads: Anchor securely to wall with elevation of conductor head as indicated.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal roof flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.
- B. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Lap counterflashing joints a minimum of 2 inches and bed with sealant.

3.5 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- E. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION 076200

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Copings.
 - 2. Roof-edge flashings.
 - 3. Roof-edge drainage systems.
 - 4. Reglets and counterflashings.

1.2 PERFORMANCE REQUIREMENTS

- A. FM Approvals' Listing: Manufacture and install copings and roof-edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification Class 1-90. Identify materials with FM Approvals' markings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Pre-installation Conference: Conduct conference at Project site.

1.7 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within **20** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXPOSED METALS

- A. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.
 - 1. Non-Patinated Exposed Finish: Mill.
 - 2. Pre-Patinated Copper-Sheet Finish: Pre-patinated according to ASTM B 882.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
 - 1. Surface: Smooth, flat finish.
 - 2. Mill Finish: As manufactured.
 - 3. Exposed Coil-Coated Finishes: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 - 4. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
 - 5. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.
- D. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.
 - 1. Surface: Smooth, flat finish.
 - 2. Exposed Coil-Coated Finishes: Pre-painted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

2.2 CONCEALED METALS

- A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.
- D. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- B. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
 - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
- C. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D 4397.
- D. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
 - 1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
 - 2. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.
 - 3. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
 - 4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 - 5. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
- D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
- G. Solder for Copper: ASTM B 32, lead-free solder.

2.5 COPINGS

- A. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Architectural Products Company.
 - b. ATAS International, Inc.
 - c. Castle Metal Products.
 - d. Cheney Flashing Company.
 - e. Hickman Company, W. P.
 - f. Johns Manville.
 - g. Merchant & Evans, Inc.
 - h. Metal-Era, Inc.
 - i. Metal-Fab Manufacturing, LLC.
 - j. MM Systems Corporation.
 - k. National Sheet Metal Systems, Inc.
 - l. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.
 - m. Petersen Aluminum Corporation.
2. Coping-Cap Material: Zinc-coated steel, nominal 24-gauge thickness.
 - a. Finish: Two-coat fluoropolymer.
 - b. Color: As selected by Architect from manufacturer's full range.
3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Special Fabrications: Two-way sloped coping cap.
5. Coping-Cap Attachment Method: Face leg hooked to continuous cleat with back leg fastener exposed, fabricated from coping-cap material.
6. Snap-on-Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches wide, with integral cleats.
7. Face Leg Cleats: Concealed, continuous galvanized-steel sheet.

2.6 ROOF-EDGE FLASHINGS

- A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous formed- or extruded-aluminum anchor bar with integral drip-edge cleat to engage fascia cover. Provide matching corner units.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hickman Company, W. P.
 - b. Johns Manville.
 - c. Metal-Era, Inc.
 - d. Metal-Fab Manufacturing, LLC.

- e. National Sheet Metal Systems, Inc.
 - f. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.
2. Fascia Cover: Fabricated from mill-finish .040 aluminum sheet – metallic color finish similar to existing stainless-steel fascia.
 3. Anchor Rail: Factory-formed 20-gauge galvanized steel rail with integral drip-edge cleat and pre-punched fastener slots.
 4. Fasteners: Minimum #10 x 2 inch stainless steel fasteners, spaced per manufacturer’s written installation instructions for compliance with the requirements of FM 1A-90.
 5. Corners: Factory-mitered and mechanically clinched and sealed watertight.
 6. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
 7. Fascia Accessories: Downspout scuppers with integral conductor head and downspout adapters.
- B. One-Piece Gravel Stops: Manufactured, one-piece, metal gravel stop in section lengths not exceeding 12 feet, with a horizontal flange and vertical leg terminating in a drip edge, and concealed splice plates of same material, finish, and shape as gravel stop. Provide matching corner units.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Architectural Products Company.
 - b. Cheney Flashing Company.
 - c. Hickman Company, W. P.
 - d. Metal-Era, Inc.
 - e. Metal-Fab Manufacturing, LLC.
 - f. MM Systems Corporation.
 - g. National Sheet Metal Systems, Inc.
 2. Fabricate from the following exposed metal:
 - a. Zinc-Coated Steel: Nominal 24-gauge (0.0239 inch) thickness.
 3. Corners: Factory mitered and mechanically clinched and sealed watertight.
- C. Zinc-Coated Steel Finish: Two-coat fluoropolymer.
1. Color: As selected by Architect from manufacturer's full range.

2.7 ROOF-EDGE DRAINAGE SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Andreas Renner KG.
 2. Architectural Products Company.
 3. ATAS International, Inc.
 4. Berger Building Products, Inc.

5. Castle Metal Products.
 6. Cheney Flashing Company.
 7. Hickman Company, W. P.
 8. Metal-Era, Inc.
 9. Metal-Fab Manufacturing, LLC.
 10. MM Systems Corporation.
 11. National Sheet Metal Systems, Inc.
 12. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.
- B. Gutters: Manufactured in uniform section lengths not exceeding 12 feet, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.
1. Fabricate from the following exposed metal:
 - a. Zinc-Coated Steel: Nominal 24-gauge (0.0239-inch) thickness.
 2. Gutter Profile: Style A according to SMACNA's "Architectural Sheet Metal Manual."
 3. Corners: Factory mitered and mechanically clinched and sealed watertight.
 4. Gutter Supports: Manufacturer's standard supports as selected by Architect with finish matching the gutters.
 5. Gutter Accessories: Wire ball downspout strainer, Flat end caps.
- C. Downspouts: Corrugated rectangular cross-section complete with elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Zinc-Coated Steel: Nominal 24-gauge (0.0239-inch) thickness.
- D. Parapet Scuppers: Manufactured with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.
1. Fabricate from the following exposed metal:
 - a. Zinc-Coated Steel: Nominal 24-gauge (0.0239-inch) thickness.
- E. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout.
1. Fabricate from the following exposed metal:
 - a. Zinc-Coated Steel: Nominal 24-gauge (0.0239-inch) thickness.
- F. Zinc-Coated Steel Finish: Two-coat fluoropolymer finish.
1. Color: As selected by Architect from manufacturer's full range.

2.8 REGLETS AND COUNTERFLASHINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cheney Flashing Company.
 2. Fry Reglet Corporation.
 3. Metal-Era, Inc.
 4. MM Systems Corporation.
 5. National Sheet Metal Systems, Inc.
- B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
1. Zinc-Coated Steel: Nominal 24-gauge (0.0239-inch thickness).
 2. Corners: Factory mitered and mechanically clinched and sealed watertight.
 3. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 4. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.
- C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches (100 mm) and in lengths not exceeding 12 feet designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:
1. Zinc-Coated Steel: Nominal 24-gauge (0.0239-inch thickness).
- D. Accessories:
1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
 2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.
1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
 3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
 4. Torch cutting of roof specialties is not permitted.

5. Install underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches. Roll laps of self-adhering sheet underlayment with roller; cover within 14 days.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 1. Coat concealed side of uncoated aluminum and stainless-steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of self-adhering, high-temperature sheet underlayment or polyethylene sheet.
 - C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
 1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise shown on Drawings.
 2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
 - D. Fastener Sizes: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
 - E. Seal joints with sealant as required by roofing-specialty manufacturer.
 - F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.
 - G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches except reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.2 COPING INSTALLATION

- A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor copings to meet performance requirements.
 1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.

3.3 ROOF-EDGE FLASHING INSTALLATION

- A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

- B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.4 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

- A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions.
- B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches apart. Attach ends with rivets and seal with sealant to make watertight. Slope to downspouts.
 - 1. Install gutter with expansion joints at locations indicated but not exceeding 40 feet apart. Install expansion joint caps.
- C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1-inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.
- D. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
- E. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch below scupper discharge.

3.5 REGLET AND COUNTERFLASHING INSTALLATION

- A. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches over top edge of base flashings.
- B. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Fit counterflashings tightly to base flashings.

3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 077100

SECTION 079200 - JOINT SEALANTS

PART 1: GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. Furnish all labor, material, plant and services required to complete caulking and sealing and as necessary to make building completely watertight.
- B. Refer to drawings for particular items requiring caulking and sealant, but joints requiring caulking and sealants shall not be limited to those shown on drawings.

1.3 RELATED WORK

- A. All in-seam sealant, lap sealant, splicing cement, and cut-off mastic shall be provided by roof membrane manufacturer or approved for compatibility with roofing membrane.

1.4 QUALITY ASSURANCE

- A. Basis of Specification:
 - 1. Pecora Corporation
- B. Acceptable Manufacturers:
 - 1. Sonneborn, Division of Contech, Inc.
 - 2. Tremco Manufacturing Company
 - 3. W. R. Grace & Company
 - 4. or acceptable substitution.
- C. Standards:
 - 1. Related Standards: Provide work in accordance with applicable standards specified and product manufacturer's specifications for materials and workmanship unless Project Documents require conformance with more stringent requirements. Provide the most stringent requirements.
- D. Quality Control:
 - 1. Seal sample areas in project as directed by Owner's Representative for each type of sealant required, in accordance with project requirements and colors selected, and obtain Architect's approval for appearance before proceeding.

1.5 SUBMITTALS

- A. Product Data:

1. Submit two copies of manufacturer's specifications and installation instructions for each type material required and proposed for use. Include description of material, physical properties and limitations for use of such materials. Include information regarding the need for and use of primers with sealants proposed, and time limit in which material must be used after date of manufacturing.
- B. Guarantee:
1. Submit written guarantee signed jointly by Sealant Installer and General Contractor agreeing that all caulking and sealant work will be free of defective material and workmanship for a period of three (3) years from date of Certificate of Substantial Completion for project, and that defective work, if any, occurring during guarantee period will be corrected at no additional cost to Owner.
 2. Submit written guarantee to Owner, through Owner's Representative prior to final acceptance of project work by Owner.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Sealant Contractor shall cooperate with Owner's Representative in delivery and storage of his equipment on Project. Equipment shall be handled by qualified and experienced worker.
- B. Products shall be delivered in original cartons or containers bearing original labels, and shall be delivered, stored and handled to prevent damage of any nature and as recommended by manufacturer.
- C. Deliver sealant materials in sealed containers with date of manufacture clearly shown on each package. Store materials in cool, dry, covered or shaded area, assigned exclusively to this Contractor. Packages and containers showing evidence of contamination due to damage shall be removed from Project Site immediately and replaced with fresh, damage-free material. Materials containing flammable and volatile solvents shall be kept away from heat, sparks and flame. Proper safety precautions must be taken in storage and application.

PART 2: PRODUCTS

2.1 SEALANT MATERIALS

- A. Type A Sealant: Two-component, modified polyurethane sealant, non-sag type, conforming to Federal Specification TT-S-277 E - Type II and ANSI A116.1.
- B. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Pecora "Dynatrol II".
 2. Sika "Sikaflex-2c NS".
 3. BASF "MasterSeal NP 2"
- C. Sealant colors as selected by Architect from standard available colors.

2.2 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

2.3 ACCESSORY MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Joint Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Bond Breaker Tape: Self-adhesive, polyethylene film tape as recommended by sealant manufacturer.
- D. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3: EXECUTION

3.1 INSPECTION

- A. Examine premises before start of work and ascertain existing conditions.
- B. Verify that other trades have completed their work as necessary before application of sealant work.
- C. Examine joint surfaces and conditions to ascertain adequate bond can be obtained, and that surfaces are free of defects or foreign substances which would be detrimental to satisfactory application of sealants specified. 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.
- D. Report any unsatisfactory conditions or defects and do not proceed with work until such conditions or defects are corrected. Starting of work shall constitute acceptance of surfaces and conditions.
- E. Proceed with installation only after all unsatisfactory conditions have been corrected.

3.2 PREPARATION AND INSTALLATION, GENERAL

- A. Prepare joint surfaces and install materials in strict accordance with manufacturer's instructions and as specified, to achieve properly sealed joints with neat, even appearance.
- B. Do not proceed with installation of sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation.
- C. Have joints or spaces to be sealed clean and dry, free of oil, grease, dust and other foreign substances which would interfere with or impair sealant work. Clean surfaces immediately before installation of primer and/or sealant as applicable and necessary.
- D. Prime joint surfaces where recommended by sealant manufacturer using primer material compatible with sealant used and proper for joint surfaces involved. Do not allow primer to spill or migrate onto adjoining surfaces.
- E. Install bond breaker tape to isolate back of sealant from backing surface wherever required by manufacturer's recommendations to ensure sealant will perform properly.
- F. Install compressible sealant backer rod or strip in joints where suitable backing does not exist and as required to provide proper depth of sealant as recommended by sealant manufacturer. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- G. Depth of sealants shall be as recommended by sealant manufacturer for conditions involved, but within the following general limitations, measured at the center (thin) section of bead:
 - 1. For normal moving joints sealed with elastomeric sealants and not subject to traffic, provide sealant depth equal to 50% of joint width, but not more than 1/2" deep nor less than 1/4" deep.
 - 2. For joints sealed with non-elastomeric sealants, provide sealant depth in the range of 75% to 125% of joint width.
- H. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses provided for each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- I. Two-part sealants shall be mixed in strict accordance with manufacturer's instructions using recommended mixing equipment. Accurately control proportions of the components to achieve ratio established by the manufacturer. Sealant mixing shall not be done until sealant is to be applied.
- J. Use sealant colors as selected and approved by Architect. General intent is to reasonably match color of adjacent finished surfaces.

- K. Sealed joints shall be smooth, free of sags or voids. Sealant surfaces shall be slightly concave, and slightly below adjoining surfaces. Tool all joints as recommended by manufacturer for sealant used.
- L. Remove excess or misplaced sealant promptly as work progresses. Clean surfaces which have been soiled with approved solvent and/or cleaning agent that will not damage surfaces.
- M. Remove defective or unsatisfactory work if any and replace with new materials after cleaning and preparing joint surfaces as recommended by manufacturer.
- N. Leave work in neat, clean condition.
- O. Remove, clean and re-caulk all previously caulked exterior joints on the building per the Construction Drawings.

3.4 CLEANING

- A. Sealant Contractor shall immediately clean all adjacent materials which have been soiled and leave work in neat, clean condition. Use only approved type stripping compounds, solvents and cleaners.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

3.6 SCHEDULE OF SEALANTS

- A. Unless otherwise noted, sealant type specified shall be used as follows:
 - 1. For all exterior joints (except joints in pavement), for interior joints in exterior walls, and for all expansion/control joints in building.
- B. Provide caulking and sealant of joints and voids where indicated on drawings and as required for completion of the work. Locations for such sealed joints and voids include but not necessarily limited to the following:
 - 1. Exterior:
 - a) All joints between and around the flashing, counter flashing and bar flashing.
 - b) Any joint locations where there is a potential for leaks.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 WORK under this section includes hollow metal doors and frames.

1.2 RELATED DOCUMENTS: drawings, general provisions of contract, General Conditions and Division 1 sections apply to this section.

1.3 RELATED WORK specified elsewhere that should be examined for its effect upon this section.

- A. Section 087100 Door Hardware
- B. Section 099000 Painting and Coating

1.4 REFERENCES SPECIFIED in this section subject to compliance as directed:

- A. ASTM-A366-95A - Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality.
- B. ASTM-A568-95 -Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.
- C. ASTM-A 569-91A - Specification for Steel, Carbon, (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial Quality.
- D. ASTM-A924-95 - General Requirements for Steel Sheet, Metallic coated by the Hot-Dip Process.
- E. ASTM-A620- Specifications for Steel, Sheet, Carbon, Drawing Quality, Special Killed, Cold Rolled (for embossed panels).
- F. ANSI A250.8 - Recommended specifications for standard steel doors and frames.
- G. SDI-105-92 - Recommended Erection Instructions for Steel Frames.
- H. ANSI/SDI A250.6 - Hardware on Steel Doors (reinforcement-application).
- I. NFPA-101 - Life Safety Code.
- L. ANSI-A250.4 Test Procedure and acceptance criteria for physical endurance, steel doors and frames.
- M. ANSI-A224.1 Test Procedure and acceptance criteria for prime painted steel surfaces for steel doors and frames.
- N. ADA, The Americans with Disabilities Act - Title III - Public Accommodations
- O. ANSI-A117.1 American National Standards Institute - Accessible and Usable Buildings and Facilities

- P. U.L. - Underwriter's Laboratories
- Q. WHI - Warnock Hersey International, Division of Inchcape Testing Services
- R. State and Local codes including Authority Having Jurisdiction

1.5 SUBMITTALS

- A. Shop Drawings: Indicate door and frame elevations and sections, materials, gages and finishes, fabrication and erection details, locations of finish hardware by dimension and locations/details of all openings and louvers. Do not proceed with any fabrication until all details are approved.
- B. Certification of Compliance: Submit any information necessary to indicate compliance to these specifications.

1.6 QUALITY ASSURANCE

- A. Certification of label construction: For components exceeding Underwriters Laboratories, Inc. (UL) - furnish inspection certificate stating that component construction conforms to UL rating requirements only if Architect is aware of such a limitation and has allowed the non-labeled unit.
- B. Hollow metal supplier shall be a qualified direct distributor of products to be furnished. The distributor shall have in their regular employment an A.H.C./C.D.C. or person of equivalent experience who will be available at reasonable times to consult with the Architect/Contractor and/or Owner regarding any matters affecting the total door and frame openings.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver doors and frames cardboard wrapped, crated, palletized or otherwise protected during transit and site storage.
- B. Inspect doors and frames upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and accepted by the Architect. Otherwise remove and replace damaged items.
- C. Store doors and frames at the building site in a dry, secure place.
 - 1. Place units on minimum 4 inches high wood blocking.
 - 2. Avoid use of non-vented plastic or canvas shelters which could create a humidity chamber.
 - 3. If cardboard wrapper/packaging on door becomes wet, remove packaging materials immediately.
 - 4. Provide 1/4- inch spaces between stacked doors to promote air circulation.

1.8 SEQUENCING AND SCHEDULING

- A. Deliver all doors and frames to the jobsite in a timely manner so not to delay

progress of other trades.

- B. Issue purchase orders to frame, door and other hardware suppliers early so not to interfere with normal quoted delivery of materials.

1.9 WARRANTY

- A. Hollow metal doors and frames shall be supplied with a one (1) year warranty against defects in materials and workmanship.
- B. Warranty to commence with substantial completion of the job.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Approved Manufacturers:
 - 1. Republic Builders Products Corp., McKenzie, TN.
 - 2. Curries Co., Mason City, IA.
 - 3. Steelcraft, Allegion plc, Dublin, Ireland
 - 4. Or approved equal.

2.2 MATERIALS

- A. Steel requirements, all doors and frames to be manufactured of commercial quality, stretcher leveled flatness, cold rolled steel per ASTM-A-366 and A-568 general requirements or galvanealed to 'A-60' minimum coating weight standard per ASTM-A924. Internal reinforcing may be manufactured of hot-rolled pickled and oiled steel per ASTM-A569.
- B. Coating Materials, primer: Use manufacturer's standard rust-inhibiting primer conforming to ANSI-A- 224.1.
- C Core Materials
 - 1. Polyurethane foam core.

2.3 FABRICATION

- A. General
 - 1. Fabricate all doors and frames in accordance with ANSI A250.8/SDI-100 except where more stringent requirements are specified.
 - 2. Prepare doors to receive finish hardware per approved schedule. Include all thru-bolting holes as required per hardware template. Do not include unnecessary cutouts in door faces not required per hardware template.
 - 3. Supply only doors and frames manufactured by one (1) of the acceptable manufacturers listed in this specification.

B. Doors

1. Classification: SDI Level 2, Model 2, seamless design.
2. Face sheets: Minimum of 18 gauge cold-rolled steel.
3. Seamless construction by welding and filling at factory only.
4. Vertical lock edges beveled 1/8 inch in 2 inches.
5. Top and bottom channels
 - a. Not less than 16 gauge - flush or inverted
 - b. Welded to the face sheets.
 - c. Close tops of out-swinging exterior doors flush by the addition of steel top channel fillers necessary.

C. Frames

1. Construction: 16 gauge cold-rolled steel at interior and exterior locations.
2. All frames set in exterior walls are to be face-welded and ground smooth, and re-primed at the welded area.
3. Provide temporary shipping bars to help protect from damage during transit and handling.
4. Temporary shipping bars to be removed before setting frames.
5. All welds on frames to be flush with neatly mitered or butted material cuts.

D. Frame Anchors

1. Wall anchors for attachment to drywall partitions:
 - a. Use manufacturer's adjustable type compression anchors with knocked down die mitered frames at drywall locations.
 - b. Use steel or wood stud anchors sized to accommodate frame jamb depth and face dimension on all welded frames.
2. All frame jamb anchors to be provided; one each jamb per 30 inches of frame height or fraction thereof.
3. Floor anchors: Angle clip type:
 - a. 16 gauge minimum.
 - b. To receive 2 fasteners per jamb.
 - c. Welded to the bottom of each jamb.

E. Preparation for Hardware

1. Reinforcement: Reinforce components for hardware installation in accordance with ANSI A250.6-1997.
 - a. All lock and closer reinforcements to be "box" or "channel" type.
 - b. All hinge and lock reinforcing on doors shall be channel-type, continuous from top to bottom of door, welded to face sheets.
2. Punch single-leaf frames to receive three (3) silencers.

3. Factory prepared hardware locations to be in accordance with "Recommended locations for Builders' Hardware for Standard Steel Doors and Frames", as adopted by The Steel Door Institute.

PART 3 EXECUTION

3.1 SETTING FRAMES

- A. Set all frames in accordance with SDI 105-92.
- B. Set welded frames in position prior to beginning partition work. Brace frames until permanent anchors are set.
- C. Set anchors for frames as work progresses. Install anchors at hinge and strike levels.
- D. Use temporary setting spreaders at all locations. Use intermediate spreaders to assure proper door clearances and header braces for grouted frames.
- E. Install all fire-rated frames in accordance with requirements of NFPA-80.

3.2 DOOR INSTALLATION

- A. Install hollow metal doors in frames using hardware as specified.
- B. Clearances at edge of doors
 1. Between door and frame at head and jambs: 1/8 inch.
 2. At meeting edges pairs of doors and at mullions: 1/8 inch.
 3. At transom panels, without transom bars: 1/8 inch.
 4. At sills without thresholds: 5/8- inch maximum above finish floor.
 5. At sills with thresholds: 1/8 inch above threshold.

3.3 ADJUSTMENT AND CLEANING

- A. Remove dirt and excess sealants, mortar or glazing compounds from exposed surfaces.
- B. Adjust moving parts for smooth operation. Use shims as necessary to allow for proper closing.
- C. Fill all dents, holes, etc. with metal filler and sand smooth and flush with adjacent surfaces – re-prime/paint to match finish.

END OF SECTION 081113

SECTION 081316 ALUMINUM ENTRANCE DOORS

PART 1 - GENERAL

1.01 SUMMARY

- A. Related Documents: Conditions of the Contract, Division 1 – General Requirements, and Drawings apply to Work of this Section.
- B. Section Includes:
 - 1. Aluminum doors.
- C. Products Furnished But Not Installed Under This Section:
 - 1. Anchoring devices that are cast in concrete.
- D. Related Sections:
 - 1. Section 061000 – Rough Carpentry.
 - 2. Section 079200 - Joint Sealers.
 - 3. Section 084313 – Aluminum Storefront.
 - 3 Section 087000 – Door Hardware.
 - 4. Section 088100 - Glass and Glazing.

1.02 REFERENCES

- A. Aluminum Association (AA):
 - 1. DAF-45 Designation System for Aluminum Finishes.
- B. American Architectural Manufacturers Association (AAMA):
 - 1. 501.2 Field Check of Metal Curtain Walls for Water Leakage.
 - 2. 2605 Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
 - 3. 606.1 Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.
 - 4. 607.1 Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
 - 5. 608.1 Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.
 - 6. 701.2 Specifications for Pile Weather-stripping.
 - 7. Manual #10 Care and Handling of Architectural Aluminum From Shop to Site.
 - 8. SFM-1 Aluminum Storefront and Entrance Manual.
- C. American National Standards Institute (ANSI):
 - 1. A117.1 Safety Standards for the Handicapped.

D. American Society for Testing and Materials (ASTM):

1. A36 Structural Steel.
2. A123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. B209 Aluminum and Aluminum - Alloy Sheet and Plate.
4. B221 Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
5. B308 Aluminum-Alloy 6061-T6 Standard Structural Shapes.
6. E283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.
7. E330 Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
8. E331 Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

E. Federal Specifications (FS):

1. TT-P-641G (1) Primer Coating, Zinc Dust-Zinc Oxide (For Galvanized Surfaces).
2. TT-P-645A Primer, Paint, Zinc Chromate, Alkyd Type.

F. Steel Structures Painting Council (SSPC):

1. Paint 12 Cold-Applied Asphalt Mastic (Extra Thick Film).

1.03 SYSTEM REQUIREMENTS

A. Design Requirements:

1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
2. Requirements shown by details are intended to establish basic dimension of units, sight lines and profiles of members.
3. Provide concealed fastening.
4. Provide entrance and storefront systems, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
5. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
6. Anchors, fasteners and braces shall be structurally stressed not more than 50% of allowable stress when maximum loads are applied.
7. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.

B. Thermal Requirements:

1. Framing systems shall accommodate expansion and contraction movement due to surface temperature differentials of 180°F without causing buckling, stress on glass, failure of joint seals, excessive stress on structural elements, reduction of performance, or other detrimental effects.
2. Ensure doors function normally within limits of specified temperature range.
3. Thermal Performance:
 - a. Thermal Transmittance Coefficient (U-factor): When tested to ASTM C236 and AAMA Specification 1503.1-98, the conductive thermal transmittance (U-factor) shall not be more than 0.65 BTU/hr/sf/°F.
 - b. Condensation Resistance Factor (CRF): When tested to AAMA Specification 1503.1-98, the condensation resistance factor shall not be less than 54.

1.04 SUBMITTALS

A. General: Submit in accordance with Division 1.

B. Product Data:

1. Submit manufacturer's descriptive literature and product specifications.
2. Include information for factory finishes, hardware, accessories, and other required components.
3. Include color charts for finish indicating manufacturer's standard colors available for selection.

C. Shop Drawings:

1. Submit shop drawings covering fabrication, installation and finish of specified systems.
2. Include following:
 - a. Fully dimensioned plans and elevations with detail coordination keys.
 - b. Locations of exposed fasteners and joints.
3. Provide detailed drawings of:
 - a. Composite members.
 - b. Joint connections for framing systems and for entrance doors.
 - c. Anchorage.
 - d. System reinforcements.
 - e. System expansion and contraction provisions.
 - f. Glazing methods and accessories.
 - g. Internal sealant requirements and recommended types.
4. Schedule of finishes.

- D. Samples:
 - 1. Submit manufacturers standard samples indicating quality of finish.
 - 2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.
- E. Qualification Data:
 - 1. Submit installer qualifications verifying years of experience.

1.05 QUALITY ASSURANCE

- A. Single Source Responsibility:
 - 1. To ensure quality of appearance and performance, obtain materials for systems from either a single manufacturer or from manufacturer approved by systems manufacturer.
- B. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.
- C. Perform Work in accordance with AAMA SFM-1 and manufacturer's written instructions.
- D. Conform to requirements of ANSI A117.1 and local amendments.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 1.
- B. Protect finished surfaces as necessary to prevent damage.
- C. Do not use adhesive papers or sprayed coatings that become firmly bonded when exposed to sun.
- D. Do not leave coating residue on any surfaces.
- E. Replace damaged units.

1.07 WARRANTY

- A. Provide warranties in accordance with Division 1.
- B. Provide written warranty in form acceptable to Owner jointly signed by manufacturer, installer and Contractor warranting work to be watertight, free from defective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within 1 year from date of Substantial Completion.
- C. Warranty shall cover following:
 - 1. Complete watertight and airtight system installation within specified tolerances.
 - 2. System is structurally sound and free from distortion.

- D. Provide written warranty stating organic coating finish will be free from fading more than 10%, chalking, yellowing, peeling, cracking, pitting, corroding or non-uniformity of color, or gloss deterioration beyond manufacturer's descriptive standards for 5 years from date of Substantial Completion and agreeing to promptly correct defects.

PART 2 - PRODUCTS

2.01 MANUFACTURERS AND PRODUCTS

- A. Subject to compliance with requirements indicated, provide products by one of the following:
 - 1. Vistawall Architectural Products, Terrell, TX.
 - 2. Or approved equal.
- B. Acceptable Entrance Systems: Standard duty systems (0.125" wall thickness; 1-3/4" deep) Model MS375 - medium stile (10" bottom rail, 3-1/2" top rail, 4-1/4" verticals).

2.02 FRAMING MATERIALS AND ACCESSORIES

- A. Aluminum:
 - 1. ASTM B221, alloy 6063-T5 for extrusions; ASTM B209, alloy 5005-H16 for sheets; or other alloys and temper recommended by manufacturer appropriate for specified finish.
- B. Internal Reinforcing:
 - 1. ASTM A36 for carbon steel; or ASTM B308 for structural aluminum.
 - 2. Shapes and sizes to suit installation.
 - 3. Steel components factory coated with alkyd type zinc chromate primer complying with FS TT-P-645.
- C. Anchorage Devices:
 - 1. Manufacturer's standard formed or fabricated steel or aluminum assemblies of shapes, plates, bars or tubes.
 - 2. Hot-dip galvanize steel assemblies after fabrication -- comply with ASTM A123, 2.0- ounce minimum coating.
- D. Fasteners:
 - 1. Aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with items being fastened.
 - 2. Provide concealed fasteners wherever possible.
 - 3. For exposed locations, provide Phillips flathead screws with finish matching item fastened.
 - 4. For concealed locations, provide manufacturer's standard fasteners.

- E. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.
- F. Protective Coatings: Cold-applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P- 645.
- G. Touch-Up Primer for Galvanized Components: Zinc oxide conforming to FS TT-P-641.
- H. Glazing Gaskets:
 - 1. Compression type design, replaceable, molded or extruded, of neoprene, polyvinyl chloride (PVC), or ethylene propylene diene monomer (EPDM).
 - 2. Profile and hardness as required, to maintain uniform pressure for watertight seal.
- I. Thermal separation consisting of extruded (PVC) poly-vinyl-chloride isolators.
- J. Weather-stripping:
 - 1. Wool pile conforming to AAMA 701.2.
 - 2. Provide EPDM or vinyl-blade gasket weather-stripping in bottom door rail, adjustable for contact with threshold.

2.03 GLASS AND GLAZING ACCESSORIES

- A. Refer to Section 08 81 00.

2.04 DOOR HARDWARE

- A. Hardware Items: See Hardware Schedule on Drawings.

2.05 FABRICATION

- A. Coordination of Fabrication:
 - 1. Check actual frame or door openings required in construction work by accurate field measurements before fabrication.
 - 2. Fabricate units to withstand loads that will be applied when system is in place.
- B. General
 - 1. Conceal fasteners wherever possible.
 - 2. Reinforce work as necessary for performance requirements, and for support to structure.
 - 3. Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or preformed separators, which will prevent contact and corrosion.
 - 4. Comply with Section 08810 for glazing requirements.
- C. Entrance Doors:
 - 1. Fabricate with mechanical joints using internal steel reinforcing plates

and shear blocks attached with fasteners and by welding.

2. Provide extruded aluminum glazing stops of square design.
3. Extruded rigid (PVC) poly-vinyl-chloride isolators are used as a thermal separator between interior cladding and door.

D. Hardware:

1. Receive hardware supplied and install in accordance with requirements of this Section.
2. Cut, reinforce, drill and tap frames and doors as required to receive hardware.
3. Comply with hardware manufacturer's templates and instructions.
4. Use concealed fasteners wherever possible.

E. Welding:

1. Comply with recommendations of the American Welding Society.
2. Use recommended electrodes and methods to avoid distortion and discoloration.
3. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.

F. Flashings: Form from sheet aluminum with same finish as extruded sections. Material thickness shall be as required, suitable to condition, without deflection or "oil-canning".

2.06 FINISHES

A. Dark Bronze Anodized:

1. Conforming to AA-M10C22A44 and AAMA 611.
2. Architectural Class II, etched, 2-step dark bronze anodic coating, 0.4 mil minimum thickness.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Division 1.

3.02 INSTALLATION

A. Erection Tolerances:

1. Limit variations from plumb and level:
 - a. 1/8 inch in 10'-0" vertically.
 - b. 1/8 inch in 20'-0" horizontally.
2. Limit variations from theoretical locations: 1/4 inch for any member at any location.
3. Limit offsets in theoretical end-to-end and edge-to-edge alignment: 1/16 inch from flush surfaces not more than 2 inches apart or out-of-flush by more than 1/4 inch.

- B. Install doors and hardware in accordance with manufacturer's printed instructions.
- C. Set units plumb, level and true to line, without warp or rack of frame.
- D. Anchor securely in place, allowing for required movement, including expansion and contraction.
- E. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or preformed separators to prevent contact and corrosion.
- F. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weather-tight construction.
- G. Coordinate installation of perimeter sealant and backing materials between assemblies and adjacent construction in accordance with requirements of Section 079200.
- H. Glazing: Refer to requirements of Section 088100.

3.03 ADJUSTING

- A. Test door operating functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

3.04 CLEANING

- A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.
- B. Clean metal surfaces exercising care to avoid damage.

END OF SECTION 081316

SECTION 084313 - ALUMINUM STOREFRONT

PART 1 - GENERAL

1.01 SUMMARY

- A. Related Documents: Conditions of the Contract, Division 1 - General Requirements and Drawings apply to Work of this Section.
- B. Section Includes:
 - 1. Storefront system, complete with reinforcing, fasteners, anchors, and attachment devices.
 - 2. Accessories necessary to complete work.
- C. Products Furnished But Not Installed Under This Section: N.A.
- D. Related Sections:
 - 1. Section 061000 – Rough Carpentry.
 - 2. Section 079200 - Sealants.
 - 3. Section 081316 – Aluminum Entrance Doors.
 - 4. Section 087000 - General Hardware Requirements.
 - 5. Section 088100 - Glass and Glazing.

1.02 REFERENCES

- A. Aluminum Association (AA):
 - 1. DAF-45 Designation System for Aluminum Finishes.
- B. American Architectural Manufacturers Association (AAMA):
 - 1. 501 Methods of Test for Exterior Walls.
 - 2. 501.2 Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
 - 3. 2605 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
 - 4. 611 Voluntary Specification for Anodized Architectural Aluminum.
 - 5. 701 Voluntary Specifications for Pile Weatherstripping and Replaceable Fenestration Weatherseals.
 - 6. 1503 Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections.
 - 7. 1801 Voluntary Specification for the Acoustical Rating of Windows, Doors, and Glazed Wall Sections.

8. CW-10 Care and Handling of Architectural Aluminum From Shop to Site.
 9. SFM-1 Aluminum Storefront and Entrance Manual.
- C. American Society for Testing and Materials (ASTM):
1. A36 Structural Steel.
 2. A123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 3. B209 Aluminum and Aluminum - Alloy Sheet and Plate.
 4. B221 Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
 5. E283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.
 6. E330 Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
 7. E331 Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
- D. Glass Association of North America (GANA):
1. Glazing Manual
- E. Federal Specifications (FS):
1. TT-P-641G (1) Primer Coating, Zinc Dust-Zinc Oxide (For Galvanized Surfaces).
 2. TT-P-645A Primer, Paint, Zinc Chromate, Alkyd Type.

1.03 SYSTEM REQUIREMENTS

- A. Design Requirements:
1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
 2. Requirements shown by details are intended to establish basic dimension of units, sight lines and profiles of members.
 3. Provide concealed fastening.
 4. Provide entrance and storefront systems, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
 5. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
 6. Anchors, fasteners and braces shall be structurally stressed not more than 50% of allowable stress when maximum loads are applied.
 7. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
 8. Framing systems shall accommodate expansion and contraction movement due to surface temperature differentials of 180 degrees F without causing buckling, stress on glass, failure of joint seals,

excessive stress on structural elements, reduction of performance, or other detrimental effects.

9. Stresses placed on structural silicone sealants shall be kept within sealant manufacturer's recommended maximum.

B. Performance Requirements:

1. Wind loads: Provide framing system capable of withstanding wind load design pressures as indicated on Sheet S102. The design pressures are based on the International Building Code; latest edition.
2. Air infiltration: Air leakage through fixed light areas of storefront shall not exceed 0.06 cfm per square foot of surface area when tested in accordance with ASTM E283 at differential static pressure of 6.24 psf.
3. Water infiltration: No uncontrolled leakage when tested in accordance with ASTM E331 at test pressure of 10 psf as defined in AAMA 501.
4. Deflection: Maximum calculated deflection of any framing member in direction normal to plane of wall when subjected to specified design pressures for spans up to and including 13'-6" shall be limited to $[1/175]$ of its clear span and for spans greater than 13'-6" deflection shall be limited to $[1/240]$ of its clear span + 1/4", except that maximum deflection of members supporting plaster surfaces shall not exceed 1/360 of its span.
5. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:
6. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:
7. Sound Transmission Class (STC): When tested to AAMA Specification 1801, the STC Rating shall not be less than:
 - Glass to Exterior – 0.54 (clear)
 - Glass to Center – 0.63 (clear)
 - Glass to Interior – 0.51 (clear)
 - Glass to Exterior – 69 frame and 60 glass (clear)
 - Glass to Center – 58 frame and 61 glass (clear)
 - Glass to Interior – 57 frame and 57 glass (clear)

- C. Testing Requirements: Provide components that have been previously tested by an independent testing laboratory.

1.04 SUBMITTALS

- A. General: Submit in accordance with Division 1 requirements.

B. Product Data:

1. Submit manufacturer's descriptive literature and product specifications.
2. Include information for factory finishes, hardware, accessories, and

other required components.

3. Include color charts for finish indicating manufacturer's standard colors available for selection.

C. Shop Drawings:

1. Submit shop drawings covering fabrication, installation and finish of specified systems.
2. Include following:
 - Fully dimensioned plans and elevations with detail coordination keys.
 - Locations of exposed fasteners and joints.
3. Provide detailed drawings of:
 - Composite members.
 - Joint connections for framing systems and for entrance doors.
 - Anchorage.
 - System reinforcements.
 - System expansion and contraction provisions.
 - Glazing methods and accessories.
 - Internal sealant requirements.
 - Thermal improvements.

D. Samples:

1. Submit manufacturers standard samples indicating quality of finish.
2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.
3. Submit samples for each type of glass, 12 x 12 inch size.

E. Test Reports:

1. Standard Systems: Submit certified copies of previous test reports substantiating performance of system in lieu of retesting. Include other supportive data as necessary.

F. Qualification Data:

1. Submit installer qualifications verifying years of experience.

G. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.

1.05 QUALITY ASSURANCE

A. Single Source Responsibility:

1. To ensure quality of appearance and performance, obtain materials for systems from either a single manufacturer or from manufacturer approved by systems manufacturer.

- B. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.
- C. Perform Work in accordance with AAMA SFM-1 and manufacturer's written instructions.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 1.
- B. Protect finished surfaces as necessary to prevent damage.
- C. Do not use adhesive papers or sprayed coatings that become firmly bonded when exposed to sun.
- D. Do not leave coating residue on any surfaces.
- E. Replace damaged units.

1.07 WARRANTY

- A. Provide warranties in accordance with Division 1.
- B. Provide written warranty in form acceptable to Owner jointly signed by manufacturer, installer and Contractor warranting work to be watertight, free from deflective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within 1 year from date of Substantial Completion.
- C. Warranty shall cover following:
 - 1. Complete watertight and airtight system installation within specified tolerances.
 - 2. System is structurally sound and free from distortion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS AND PRODUCTS

- A. Subject to compliance with requirements indicated, provide products by one of the following:
 - 1. Vistawall Architectural Products, www.vistawall.com (basis of design)
 - 2. Tubelite, www.tubeliteinc.com.
 - 3. Kawneer, www.kawneer.com.
 - 4. Or equal as approved by the Architect.
- B. Acceptable Storefront Framing System (basis of design):
 - 1. Series 3000 Thermal MultiPlane, glass set to the center, thermally broken and exterior loaded.
 - 2. 2"x 4-1/2" mullion profile. This system uses a poured-in-place

polyurethane thermal pocket to create its thermal break. This system accommodates 1" glass thickness.

2.02 FRAMING MATERIALS AND ACCESSORIES

A. Aluminum:

1. ASTM B221, alloy 6063-T5 for extrusions; ASTM B209, alloy 5005-H16 for sheets; or other alloys and temper recommended by manufacturer appropriate for specified finish.

B. Internal Reinforcing:

1. ASTM A36 for carbon steel.
2. Shapes and sizes to suit installation.
3. Steel components factory coated with alkyd type zinc chromate primer complying with FS TT-P-645.

C. Anchorage Devices:

1. Manufacturer's standard formed or fabricated steel or aluminum assemblies of shapes, plates, bars or tubes.
2. Hot-dip galvanize steel assemblies after fabrication; comply with ASTM A123, 2.0 ounce minimum coating.

D. Fasteners:

1. Aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with items being fastened.
2. Provide concealed fasteners wherever possible.
3. For exposed locations, provide Phillips flathead screws with finish matching item fastened.
4. For concealed locations, provide manufacturer's standard fasteners.

E. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.

F. Protective Coatings: Cold-applied asphalt mastic complying with SSPC, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.

G. Touch-Up Primer for Galvanized Components: Zinc oxide conforming with FS TT-P-641.

H. Glazing Gaskets:

1. Compression type design, replaceable, molded or extruded, of neoprene, polyvinyl chloride (PVC), or ethylene propylene diene monomer (EPDM).
2. Profile and hardness as required to maintain uniform pressure for watertight seal.

I. Weatherstripping:

1. Wool pile conforming to AAMA 701.2.
2. Provide EPDM or vinyl-blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.

J. Internal Sealants and Baffles.

2.03 GLASS AND GLAZING ACCESSORIES

- A. Refer to Section 088100.

2.04 FABRICATION

A. Coordination of Fabrication:

1. Check actual frame or door openings required in construction work by accurate field measurements before fabrication.
2. Fabricate units to withstand loads that will be applied when system is in place.

B. General

1. Conceal fasteners wherever possible.
2. Reinforce work as necessary for performance requirements, and for support to structure.
3. Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or preformed separators, which will prevent contact and corrosion.
4. Comply with Section 088100 for glazing requirements.

C. Aluminum Framing:

1. Provide members of size, shape and profile indicated, designed to provide for glazing from exterior.
2. Provide manufacturer's standard thermal break between exterior and interior aluminum surfaces.
3. Fabricate frame assemblies with joints straight and tight fitting.
4. Reinforce internally with structural members as necessary to support design loads.
5. Maintain accurate relation of planes and angles, with hairline fit of contacting members.
6. Seal horizontals and direct moisture accumulation to exterior.
7. Provide flashings and other materials used internally or externally that are corrosive resistant, non-staining, non-bleeding and compatible with adjoining materials.

- D. Provide manufacturer's extrusions and accessories to accommodate expansion and contraction due to temperature changes without detrimental to appearance or performance.

E. Welding:

1. Comply with recommendations of the American Welding Society.
 2. Use recommended electrodes and methods to avoid distortion and discoloration.
 3. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.
- F. Flashings: Form from sheet aluminum with same finish as extruded sections. Apply finish after fabrication. Material thickness as required to suit condition without deflection or "oil-canning".

2.05 FINISHES

- A. Dark Bronze Anodized:
1. Conforming to AA-M10C22A44 and AAMA 611.
 2. Architectural Class II, 2-step dark bronze anodic coating, 0.4 mil minimum thickness.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions and proceed with Work in accordance with Division 1.

3.02 INSTALLATION

- A. Erection Tolerances:
1. Limit variations from plumb and level:
 - a. 1/8 inch in 10'-0" vertically.
 - b. 1/8 inch in 20'-0" horizontally.
 2. Limit variations from theoretical locations: 1/4 inch for any member at any location.
 3. Limit offsets in theoretical end-to-end and edge-to-edge alignment: 1/16 inch from flush surfaces not more than 2 inches apart or out-of-flush by more than 1/4 inch.
- B. Install doors and hardware in accordance with manufacturer's printed instructions.
- C. Set units plumb, level and true to line, without warp or rack of frame.
- D. Anchor securely in place, allowing for required movement, including expansion and contraction.
- E. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or preformed separators to prevent contact and corrosion.
- F. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weather-tight construction.

- G. Coordinate installation of perimeter sealant and backing materials between assemblies and adjacent construction in accordance with requirements of Section 079200.
- H. Glazing: Refer to requirements of Section 088100.

3.03 ADJUSTING

- A. Test door operating functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

3.04 CLEANING

- A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.
- B. Clean metal surfaces exercising care to avoid damage.

END OF SECTION 084313

SECTION 087000 - DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. General requirements for finish hardware related to wood and hollow metal doors.
 - 2. Contractor shall prep hollow metal door frames for door hardware.
 - 3. Contractor shall furnish all temporary keys and temporary cores for the project.
 - 4. Owner shall furnish all permanent keys and permanent cores for the project.
- B. Related Sections
 - 1. Section 081113 – Hollow Metal Doors and Frames
 - 2. Section 081429 – Factory-Finished Flush Wood Doors

1.2 DEFINITIONS

- A. Builders Hardware Manufacturer's Association (BHMA) Hardware Functions

1.3 SUBMITTALS

- A. Product Data
 - 1. Manufacturer's information/cut sheets.
 - 2. Two copies of Manufacturer's installation, adjustment, and maintenance instructions for each piece of hardware. Include one set in Operation and Maintenance Manuals and send one set with hardware when delivered.
 - 3. Copy of hardware schedule.
- B. Shop Drawings - Submit hardware schedule indicating hardware to be supplied. Schedule shall indicate details such as proper type of strike plates, hand, backset, hand and degree opening of closer, length of kickplates, type of doorstop, and other necessary information necessary to determine exact hardware requirements.
- C. Quality Assurance / Control - Certificate or letter signed by hardware supplier and by Contractor stating that hardware provided is same as that specified in Contract Documents.

1.4 QUALITY ASSURANCE

- A. Suppliers bidding this work shall have two years minimum experience in providing, detailing, scheduling, and installing builders hardware and shall employ at least one full time DHI Architectural Hardware Consultant (AHC).

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Neatly and securely package hardware items by hardware group and identify for individual door with specified group number and set number used on Supplier's hardware schedule. Include fasteners and accessories necessary for installation and operation of finish hardware in same package.

PART 2 PRODUCTS

2.1 HARDWARE

- A. Refer to Finish Hardware Schedule on drawings for specified hardware.
- B. Manufacturers: Products of the following manufacturer's will be considered acceptable provided products are of equivalent weight, function, materials, and design. All hardware to be Grade 1 (Heavy Duty Commercial). Submit others for prior approval by Architect.
 - 1. Cylinder Interchangeable Cores:
 - a. Manufacturer: Best 7-Pin series to match existing facility keying system, Owner furnished / contractor installed.
 - b. Finish: BHMA 626.
 - 2. Rim Cylinders for Interchangeable Cores:
 - a. Manufacturers (Compatible with cores): Best, Schlage, Yale, Dorma, Corbin Russwin.
 - b. Finish: BHMA 626.
 - 3. Exit Panics with Concealed Vertical Rods, Exterior Night Latch Cylinder, Pull, and Interior Cylinder Dogging:
 - a. Manufacturers: Corbin Russwin, Dorma, Yale, Von Duprin, or approved equal.
 - b. Finish: BHMA 626.
 - 4. Closers with Cover, Parallel Arm, Spring Cush, and Holder:
 - a. Manufacturers: Dorma, LCN, Norton, or approved equal.
 - b. Finish: BHMA 689.
 - 5. Closer with Cover, Parallel Arm and Spring Cush Stops:
 - a. Manufacturers: Dorma, LCN, Norton.
 - b. Finish: BHMA 689.
 - 6. Kickplates:
 - a. Manufacturers: Hager, Ives, National Guard, Rockwood, or approved equal.
 - b. Finish: BHMA 630.
 - 7. Weather Stripping: Polymeric bulb type, replaceable (By Door Manufacturer).
 - 8. Perimeter Smoke Seal Gaskets:
 - a. Manufacturers: Hager, Ives, National Guard, Pemko, or approved equal.
 - b. Finish: Black vinyl.
 - 9. Meeting Stile Gaskets: (By Door Manufacturer).

10. Smoke Seal Meeting Stile Split Astragals:
 - a. Manufacturers: Hager, Ives, National Guard, Pemko, or approved equal.
 - b. Finish: BHMA 689 trim with black vinyl gaskets.
11. Smoke Seal Door Bottom Sweeps:
 - a. Manufacturers: Hager, Ives, National Guard, Pemko, or approved equal.
 - b. Finish: BHMA 689 with black vinyl gaskets.
12. Thresholds (ADA / ANSI Compliant):
 - a. Manufacturers: Hager, Ives, National Guard, Pemko, or approved equal.
 - b. Finish: BHMA 689.

2.2 FASTENERS

- A. Fasteners shall be of suitable types, sizes and quantities to properly secure hardware. Fasteners shall be of same material and finish as hardware unless otherwise specified. Fasteners exposed to weather shall be non-ferrous or corrosion resisting steel.

PART 3 EXECUTION

3.1 PREPARATION

- A. Before ordering materials, examine documents to be assured that material to be ordered is appropriate for substrate to which it is to be secured and will function as intended.

3.2 INSTALLATION

- A. Follow guidelines of DHI "Recommended Locations for Builder's Hardware and hardware manufacturers' instructions.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- C. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- D. Set thresholds in full bed of butyl-rubber or polyisobutylene mastic sealant.
- E. Adjust operation, clean and protect.

END OF SECTION 087000

SECTION 087113 - AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Power door operators for swinging doors.

1.3 DEFINITIONS

- A. AAADM: American Association of Automatic Door Manufacturers.
- B. Activation Device: A control that, when actuated, sends an electrical signal to the door operator to open the door.
- C. Safety Device: A control that, to avoid injury, prevents a door from opening or closing.
- D. For automatic door terminology, see BHMA A156.10 for definitions of terms.

1.4 COORDINATION

- A. Coordinate requirements and functions of exterior door operators and interior door operators, including the timing of opening and closing to maintain function of the Vestibule.
- B. Templates: Distribute templates for doors, frames, and other work specified to be factory-prepared and reinforced for installing automatic door operators.
- C. Coordinate hardware for doors with operators to ensure proper size, thickness, hand, function, and finish.
- D. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to the following:

1. Power supplies.
2. Remote activation devices.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for automatic door operators.
 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For automatic door operators.
 1. Include plans, elevations, sections, hardware mounting heights, and attachment details.
 2. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 3. Indicate locations of activation and safety devices.
 4. Include diagrams for power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of automatic door operator.
- C. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For automatic door operators, safety devices, and control systems, to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer for installation and maintenance of units required for this Project.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of automatic door operators that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Faulty or sporadic operation of automatic door operator, including controls.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering or use.
2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Besam Entrance Solutions; ASSA ABLOY.
 2. DORMA USA, Inc.
 3. Hager Companies.
 4. Horton Automatics; a division of Overhead Door Corporation.
 5. LCN; an Allegion brand.
 6. SARGENT Manufacturing Company; ASSA ABLOY.
 7. Stanley Access Technologies.
- B. Source Limitations: Obtain automatic door operators, including activation and safety devices, from single source from single manufacturer.

2.2 AUTOMATIC DOOR OPERATORS, GENERAL

- A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated; and in accordance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation and safety devices.
- B. Electromechanical Operating System: Self-contained unit powered by permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, connections for power and activation- and safety-device wiring, and manual operation, including spring closing when power is off.
- C. Cover for Surface-Mounted Operators: Fabricated from 0.125-inch- thick, extruded or formed aluminum; manufacturer's standard width; with enclosed end caps, provision for maintenance access, and fasteners concealed when door is in closed position.

- D. Brackets and Reinforcements: Fabricated from aluminum with non-staining, nonferrous shims for aligning system components.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 POWER DOOR OPERATORS FOR SWINGING DOORS

- A. Standard: BHMA A156.10.
- B. Performance Requirements:
 - 1. Opening Force:
 - a. Power-Operated Swinging Doors: Not more than 30 lbf required to manually open door if power fails.
 - 2. Entrapment-Prevention Force: Not more than 40 lbf required to prevent stopped door in the last 10 degrees of opening from moving in the direction of opening; not more than 30 lbf required to prevent stopped door from moving in direction of closing.
- C. Configuration: Operator to control exterior and interior swinging doors in series.
 - 1. Traffic Pattern: One way; exterior activation device opens right hand exterior and interior doors (when facing doors from exterior) in series, and interior activation device opens left hand interior and exterior doors (when facing doors from interior) in series.
 - 2. Operator Mounting: Surface.
- D. Operation: Power opening and spring closing. Provide time delay for door to remain open before initiating closing cycle as required by BHMA A156.10.
- E. Operating System: Electromechanical.
- F. Microprocessor Control Unit: Solid-state controller.
- G. Features:
 - 1. Adjustable opening and closing speed.
 - 2. Adjustable opening and closing force.
 - 3. Adjustable hold-open time from zero to 30 seconds.
 - 4. Adjustable time delay.
 - 5. Adjustable limit switch.
 - 6. Automatic door re-open if stopped while closing.
 - 7. On-off/hold-open switch to control electric power to operator; key operated.

- H. Controls: Activation and safety devices in accordance with BHMA standards.
 - 1. Activation Device: Push-plate switch on each side of door to activate door operator.
 - 2. Safety Device: Presence sensor mounted on door header to detect pedestrians in presence zone and to prevent door from closing.
- I. Exposed Finish: Class I, clear anodic finish.

2.4 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Extrusions: ASTM B221.
 - 2. Sheet: ASTM B209.
- B. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness, in manufacturer's standard thickness.
- C. Fasteners and Accessories: Corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.5 CONTROLS

- A. General: Provide controls, including activation and safety devices, in accordance with BHMA standards; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.
- B. Presence Sensors: Self-contained, active-infrared scanner units; adjustable to provide detection field sizes and functions required by BHMA A156.10. Sensors shall remain active at all times.
- C. Push-Plate Switch: Momentary-contact door control switch with flat push-plate actuator with contrasting-colored, engraved message.
 - 1. Configuration: Square push plate or push-button switch with 2-by-4-inch junction box.
 - a. Mounting: Surface-mounted on building in proximity to the entrance doors (where shown on drawings).
 - 2. Push-Plate Material: Stainless steel.
 - 3. Message: International symbol of accessibility and/or "Push to Open."

- D. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

2.6 ACCESSORIES

- A. Signage: As required by cited BHMA standard for type of door and its operation.
 - 1. Application Process: Operator manufacturer's standard process.
 - 2. Provide sign materials with instructions for field application when operators are installed.

2.7 FABRICATION

- A. Factory-fabricate automatic door operators to comply with indicated standards.
- B. Form aluminum shapes before finishing.
- C. Fabricate exterior components to drain condensation and water-passing joints within operator enclosure to the exterior.
- D. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match operator.
- E. Provide metal cladding, completely covering visible surfaces before shipment to Project site. Fabricate cladding with concealed fasteners and connection devices, with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion, and with allowance for thermal expansion at exterior doors.

2.8 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary, protective covering before shipping.
- B. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

2.9 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, door and frame preparation and reinforcements, and other conditions affecting performance of automatic door operators.
- B. Examine roughing-in for electrical systems to verify actual locations of power connections before automatic door operator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install automatic door operators in accordance with manufacturer's written instructions and cited BHMA standard for type of door operation and direction of pedestrian travel, including signage, controls, wiring, remote power units if any, and connection to building's power supply.
 - 1. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion.
 - 2. Install operators true in alignment with established lines and door geometry without warp or rack. Anchor securely in place.
- B. Controls: Install activation and safety devices in accordance with manufacturer's written instructions and cited BHMA standard for operator type and direction of pedestrian travel. Connect control wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Signage: Apply on both sides of each door as required by cited BHMA standard for type of door operator and direction of pedestrian travel.

3.3 ADJUSTING

- A. Adjust automatic door operators to function smoothly and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.
 - 1. Adjust operators on exterior and interior doors for tight closure.
- B. After completing installation of automatic door operators, inspect exposed finishes on doors and operators. Repair damaged finish to match original finish.
- C. Readjust automatic door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).

- D. Occupancy Adjustment: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain automatic door operators.

END OF SECTION 087113

SECTION 088100 - GLASS AND GLAZING

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Glass
 - 2. Glazing materials
- B. Related Items
 - 1. Section 079200 - Joint Sealants
 - 2. Section 084113 – Aluminum Storefront
 - 3. Section 085113 – Aluminum Windows

1.2 DEFINITIONS

- A. Manufacturer: A firm that produces primary glass or fabricated glass as defined in referenced glazing publications
- B. Interspace: Space between lites of any insulating glass unit that contains dehydrated air or a specified gas.
- C. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking and other indications of deterioration in metallic coating.
- D. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
- E. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination material obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standards.

1.3 DESIGN REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movements, wind and impact loads without failure, including loss or glass breakage due to defective manufacture, fabrication, and installation, deterioration of glazing materials and other defects in construction.

- B. Glass Design: Provide glass lites in the thickness and strengths (annealed or heat-treated) to meet or exceed the following criteria based on analysis of Project loads and in-service conditions.
- C. Minimum glass thickness of lites composed of annealed or heat-treated glass are selected so the worst-case probability of failure does not exceed the following:
 - 1. Eight (8) lites per 1000 for lites set vertically or not over 15 degrees off vertical and under wind action.
 - 2. One (1) lite per 1000 for lites set over 15 degrees off vertical and under action of wind or snow.
 - 3. Specified Design Wind Loads: As indicated on the Structural Drawings
 - 4. Specified Design Snow Loads: As indicated on the Structural Drawings, but not less than snow loads applicable to Project, required by ASCE 7, “Minimum Design Loads for Buildings and Other Structures”: Section 7, “Snow Loads.
 - 5. Minimum Glass Thickness for Exterior Lites: Not less than 6mm
 - 6. Thickness of Tinted and Heat-Absorbing glass: Provide the same thickness of each tint color indicated throughout Project.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer’s published test data, as determined according to procedures indicated below:
 - 1. Center-of-glass U-values: NFRC 100 methodology using LBL-35298 WINDOW 5.2 computer program, expressed as BTU/sq ft x h x deg F.
 - 2. Center-of-glass solar heat gain coefficient: NFRC 200 methodology using LBL-35298 WINDOW 5.2 computer program
 - 3. Solar Optical Properties: NFRC 300.

1.4 SUBMITTALS

- A. Submit 12-inch square samples of each type of glass indicated except for clear monolithic glass products, and 12-inch long samples of each color required for each type of sealant or gasket exposed to view.
- B. Glazing contractor to obtain compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealants and other glazing materials.
- C. Product Certificates: Obtain Certificate of Compliance for all glass products

1.5 QUALITY ASSURANCE

- A. Comply with published recommendations of glass product manufacturers and organizations below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this section or in referenced standards.
 - 1. GANA Publications

- a. GANA Glazing Manual
 - b. Tempering Division – Engineering Standards Manual
- B. Safety glass products are to comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.
- 1. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.
- C. Insulating glass products are to be permanently marked either on spacers or at least one component lite of units with appropriate certification label of inspecting and testing agency indicated below:
- 1. Insulating Glass Certification Council (IGCC).
- D. Single Source fabrication responsibility: Fabrication processes, including Low E and reflective coatings, insulating, laminating, silkscreen, and tempering, shall be fabricated by a single Fabricator.
- E. Glass fabricator to have 10 years of experience and meet ANSI / ASQC Q9002 1994.
- F. Mockups: Before glazing, build mockups for each glass product indicated below to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups using materials indicated for the completed work.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by the glazing material manufacturers and when glazing channel substrates are wet from rain, frost condensation, or other causes.
 - 1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

1.8 WARRANTY

- A. Provide a written 10-year warranty from date of manufacture for coated glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.
- B. Provide a written 5-year warranty from date of manufacture for laminated glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.

- C. Provide a written 10-year warranty (vertical application) from date of manufacture for insulating glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, protecting, and maintaining practices contrary to glass manufacturer's published instructions.
- D. Provide a written 5-year warranty from date of manufacture. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.
- E. Include the above warranty information in closeout documentation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with these requirements, products by the following manufacturers are acceptable.
 - 1. Approved Manufacturers:
 - a. Oldcastle Glass.
 - b. Guardian Industries.
 - c. Pilkington.
 - d. Vitro Architectural Glass (PPG Industries).
 - e. Viracon.
 - f. Or approved equal.

2.2 GLASS PRODUCTS

- A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.
- B. Annealed Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.
 - 1. Fabrication process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
 - 2. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 - 3. For uncoated glass, comply with requirements for Condition A.
 - 4. For coated vision glass, comply with requirements for Condition C.
 - 5. Provide Kind FT (fully-tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated or required.
- C. Insulating Glass

1. ASTM E773 Seal Durability of Sealed Insulating Glass Units
2. ASTM E774 Sealed Insulating Glass Units
3. Sealed insulating glass units to be double sealed with a primary seal of black (or gray) polyisobutylene and a secondary seal of black (or gray) silicone.
4. Lites shall be separated by an aluminum spacer with 3 bent corners and 1 keyed-soldered corner, or 4 bent corners and a straight butyl injected zinc plated steel straight key joint, to provide a hermetically sealed and dehydrated air space.
5. Units shall be certified for compliance with seal classification "CBA" by the Insulating Glass Certification Council (IGCC) and tested in accordance with the above ASTM Test Methods.

2.3 MISCELLANEOUS GLAZING MATERIALS

- A. Select glazing sealants, tapes, gaskets and other glazing materials of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.

2.4 GLASS SCHEDULE

- A. Low-E Insulating Glass (Storefront Framing).
 1. Exterior Pane - Tint: Clear.
 - a. Thickness: 1/4".
 - b. Glass strength: tempered.
 - c. Coating on surface #1: none.
 - d. Coating on surface #2: SolarBan 60.
 2. Airspace -
 - a. Nominal thickness: 1/2"
 - b. Gas fill: hydrated air
 3. Interior Pane - Tint: Clear.
 - a. Thickness: 1/4".
 - b. Glass strength: tempered.
 - c. Coating on surface #3: none.
 - d. Coating on surface #4: none.
 4. Unit Makeup
 - a. Overall Thickness of insulating glass unit shall be 1".
- B. Low-E Insulating Glass (Aluminum Entrance Doors).
 1. Exterior Pane - Tint: clear.
 - a. Thickness: 1/4".
 - b. Glass strength: tempered.

- c. Coating on surface #1: none.
- d. Coating on surface #2: SolarBan 60.
- 2. Airspace -
 - a. Nominal thickness: 1/2"
 - b. Gas fill: hydrated air
- 3. Interior Pane - Tint: clear.
 - a. Thickness: 1/4".
 - b. Glass strength: tempered.
 - c. Coating on surface #3: none.
 - d. Coating on surface #4: none.
- 4. Unit Makeup
 - a. Overall Thickness of insulating glass unit shall be 1".

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify prepared openings for glazing are correctly sized and within tolerance.
- B. Verify that a functioning weep system is present.
- C. Verify that the minimum required face and edge clearances are being followed.
- D. Do not proceed with glazing until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing remove coatings not firmly bonded to substrates.

3.3 GLAZING

- A. Install products using the recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials except where more stringent requirements are indicated, including those in "GANA Glazing Manual".
- B. Protect glass from edge damage during the handling and installation.
- C. Protect glass from contact with contaminating substances resulting from construction operations including weld splatter.
- D. Remove and replace glass that is broken, chipped, cracked or damaged in any way.

3.4 CLEANING

- A. Clean excess sealant or compound from glass and framing members immediately after application, using solvents or cleaners recommended by manufacturers.

END OF SECTION 088100

SECTION 092216 - NON-LOADBEARING STEEL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior wall framing system.
- B. Ceiling suspension system.

1.2 RELATED SECTIONS

- A. Section 061000 – Rough Carpentry.
- B. Section 092900 - Gypsum Board.

1.3 REFERENCES

- A. ASTM A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
- B. ASTM C645 - Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.
- C. ASTM C754 - Specification for Installation of Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board, or Water-Resistant Backing Board.
- D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- F. ASTM E90 - Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- G. ASTM E413 - Classification for Rating Sound Insulation.
- H. ASTM E119 - Specification for Fire Tests of Building Construction and Materials.
- I. GA-600 - Fire Resistance Design Manual.
- J. AISI – American Iron and Steel Institute Standard for Cold Formed Steel Framing, Code of Standard Practice (AISICOSP)

1.4 DESIGN REQUIREMENTS

- A. Provide non-load bearing steel stud partitions with deflections conforming to L/240 at 5 PSF typical for gypsum board walls.
- B. Fire-Resistive Rating: Where indicated on Drawings, provide materials and construction that are identical to those assemblies whose fire resistance rating

has been determined per ASTM E119 by a testing and inspecting organization acceptable to authorities having jurisdiction.

1. Meet or exceed fire resistance requirements outlined under provisions of the GA-600 Fire Resistance Design Manual for wall and ceiling assemblies.
 2. Meet or exceed flame/fuel/smoke requirements of ASTM E84 surface burning characteristics for finish materials.
- C. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

1.5 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Shop Drawings: Indicate details associated with acoustical seals, opening locations and details, and opening termination details.
- C. Product Data: Provide manufacturer's data on metal framing.
- D. Provide manufacturers written installation instructions.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum 5 years documented experience.
- B. Installer Qualifications: Installer experienced in performing work of this Section who has specialized in installation of work similar to that required for the Project.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store materials protected from exposure to rain, snow or other harmful weather conditions, at temperature and humidity conditions per AISI COSP section F3.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Marino\WARE; www.marinoware.com.
- B. MBA Building Supplies, Inc., www.mbastuds.com.
- C. SCAFCO Corporation, www.scafco.com.
- D. Or equal as approved by Architect.

2.2 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. Framing Members - General: Comply with ASTM C754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C645 requirements for metal, unless otherwise indicated.
 - 2. Protective Coating: manufacturer's standard corrosion-resistant zinc coating, unless otherwise indicated.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

- A. Steel Studs and Runners: ASTM C645.
 - 1. Minimum Base-Metal Thickness: 25 gauge equivalent, 0.0147 inch.
 - 2. Web Size: 3-5/8 inches.
 - 3. Flanges: Equal lengths 1-1/4 inches.
- B. Hat-Shaped, Rigid Furring Channels: ASTM C645.
 - 1. Minimum Base Metal Thickness: 25 gauge, 0.0179 inch.
 - 2. Depth: 7/8 inch.
 - 3. Depth: 1-1/2 inches.

2.4 SUSPENSION SYSTEM COMPONENTS

- A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.0625 inch diameter wire, or double strand of 0.0475 inch diameter wire.
- B. Hanger Attachments to Concrete:
 - 1. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E1190.
- C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.162 inch diameter.
- D. Furring Channels:
 - 1. Cold-Rolled Channels: 0.0538 inch bare-steel thickness, with minimum 1/2-inch wide flanges, 3/4 inch deep.

2. Furring Channels: 1-1/2 inches deep.
 - a. Minimum Base Metal Thickness: 25 gauge, 0.0179 inch.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions under which Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Examine substrates to which metal framed construction attaches or abuts. Verify pre-set hollow metal frames, cast-in anchors, and structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of wall framing.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 ERECTION

- A. Metal Framing - General:
 1. Install steel framing to comply with ASTM C754 and with ASTM C840 requirements applicable to framing installation.
 - a. Conventional Drywall Framing: Materials as specified in Part 2 of this Section.
 2. Install supplementary framing, blocking, bracing at termination in Work, and support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar construction to comply with details indicated on Drawings and with "Gypsum Construction Handbook" published by United States Gypsum Company.
 3. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement, at locations indicated below to comply with details indicated on Drawings:
 - a. Where edges of suspended ceilings abut building structure horizontally at ceiling perimeters or penetrations of structural elements.
 - b. Where partitions and wall framing abuts overhead structure.
 - c. Provide slip type joint as detailed to attain lateral support and avoid axial loading.
 4. Do not bridge building expansion and control joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members.
- B. Metal Framing - Walls and Partitions:
 1. Install runners (track) at floors, ceilings, and structural walls and columns where gypsum board stud system abuts other construction.
 - a. Where studs are installed directly against exterior walls, install asphalt felt strips between studs and wall.

2. Metal Stud Spacing: Maximum 16 inches on center, unless noted otherwise. For applications that exceed the laterally unsupported height limitations, provide engineered studs. Use gage and depth of stud required to meet maximum deflection requirements.
3. Installation Tolerances: Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from plane of faces of adjacent framing.
4. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
5. Install steel studs in sizes and spacing indicated on Drawings, but not less than that required by referenced steel framing installation standards.
6. Install steel studs so that flanges point in the same direction and gypsum boards can be installed in the direction opposite to that of the flanges.
7. Frame door openings to comply with details indicated on Drawings, with GA-219, and with applicable published recommendations of gypsum board manufacturer. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames. Install runner track section (for cripple studs) at head and secure to jamb studs.
8. Extend vertical jamb studs through suspended ceilings and attach to underside of floor or roof structure above.
9. Frame openings other than door openings to comply with details indicated on Drawings, or if none is indicated, in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads.
10. Blocking: Bolt or screw steel channels to metal studs. Install concealed wood blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, and other related items that require backing for support under provisions of Division 6.
11. Install vapor retarder on interior of framing members of exterior walls and soffits. Comply with the following requirements:
 - a. Extend vapor retarder to extremities of exterior insulated walls, and to cover miscellaneous voids in insulated substrates, including those that have been stuffed with loose thermal insulation.
 - b. Seal vertical joints in vapor retarders over framing by lapping vapor retarders not less than 2 wall studs. Fasten vapor retarders to framing at top, end, and bottom edges, at perimeter of wall openings, and at lap joints.
 - c. Seal joints in vapor retarders caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with cloth or aluminized tape which bonds permanently to vapor retarder.
 - d. Repair tears and punctures in vapor retarder immediately before concealment by application of gypsum board or other construction.
 - e. Use fire-resistive type vapor retarder in locations where vapor retarder is

not covered with gypsum board. Attach as per manufacturer's written instructions.

- f. Use non-resistive type vapor retarder where vapor retarder is covered with gypsum board.

C. Metal Framing - Suspended and Furred Ceilings:

1. Secure hangers to structural support by connecting directly to structure where possible, otherwise connect to cast-in concrete inserts or other anchorage devices or fasteners as indicated on Drawings.
 - a. Do not attach hangers to underside of concrete slabs with power-actuated fasteners.
2. Install metal ceiling framing per ASTM C754, and space main runners at 4 feet on center maximum.
3. Do not connect or suspend steel framing from ducts, pipes, or conduit.
4. Keep hangers and braces 2 inches clear of ducts, pipes, or conduits.
5. Sway-brace suspended steel framing with hangers used for support.
6. Comply with local governing code requirements where applicable.

3.3 PROTECTION

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

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Furnish and install gypsum board as described in Contract Documents.

1.2 REFERENCES

- A. Gypsum Association
 - 1. GA-214-90 - 'Recommended Specification: Levels of Gypsum Board Finish'
- B. American Society for Testing and Materials
 - 1. ASTM C 36-99, 'Standard Specification for Gypsum Wallboard'
 - 2. ASTM C 475-94, 'Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board'
 - 3. ASTM C 840-01, 'Standard Specification for Application and Finishing of Gypsum Board'
 - 4. ASTM C 1002-00, 'Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panels or Metal Plaster Bases to Wood Studs or Steel Studs'

1.3 SUBMITTALS

- A. Quality Assurance/Control - Fire test results or assembly diagrams and numbers confirming products used will provide required fire ratings with installation configurations used.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name, applicable standard designation, and Manufacturer's name.
- B. Store material under roof and keep dry. Stack gypsum board flat and protect from damage.

1.5 PROJECT CONDITIONS

- A. Environmental Requirements
 - 1. Temperature shall be 50 deg F and 95 deg F maximum day and night during entire joint operation and until execution of Certificate of Substantial Completion.
 - 2. Provide ventilation to eliminate excessive moisture.
 - 3. Avoid hot air drafts which will cause too rapid drying.

PART 2 PRODUCTS

2.1 MATERIALS

A. Gypsum Board

1. For single layer gypsum board, use following Approved Products -
 - a. Type C gypsum board by one of the following manufacturers:
 - 1) USG Firecode C.
 - 2) National Gypsum Firecode Type C.
 - 3) Or approved equal.
2. For wet locations (toilet rooms, mechanical room, shower room, mud room)
 - a. Type X mold and mildew-resistant gypsum board by one of the following:
 - 1) USG Mold-Tough Firecode X.
 - 2) National Gypsum Gold-Bond XP.
 - 3) Or approved equal.

2.2 ACCESSORIES

A. Gypsum Board Mounting Accessories

1. Quality Standards -
 - a. Resilient Channels - RC-1 by USG
 - b. Other accessories as required by Manufacturer's fire tests to provide necessary fire ratings.
 - c. Equal as approved by Architect before installation.

B. Corner Trim, Edge Trim and Control Joints

1. Acceptable and Approved Products -
 - a. Metal - 24 ga. minimum steel, electrolytic galvanized zinc-coated, treated for maximum cement and paint adhesion. Surfaces to receive bedding cement knurled for maximum bonding.

C. Joint Compound

1. Best grade or type recommended by Board Manufacturer and meeting requirements of ASTM C 475.
 - a. Use Taping Compound for first coat to embed tape and accessories.
 - b. Use Taping Compound or All-Purpose Compound for subsequent coats except final coat.
 - c. Use Finishing Compound for final coat and for skim coat.

D. Joint Reinforcing - Paper reinforcing tape acceptable to Board Manufacturer.

E. Primer recommended by manufacturer of finish paint coat.

F. Fasteners

1. Bugle head screws meeting requirements of ASTM C 1002.
 - a. Types -
 - 1) Type W - For fastening gypsum board to wood members other than truss members and plywood web joists.
 - b. Lengths - Of length to penetrate wood framing 5/8 inch minimum.

2.2 MANUFACTURERS

- A. Chicago Metallic, www.chicago-metallic.com
- B. Drywall Systems International, www.no-coat.com
- C. Georgia Pacific, www.gp.com
- D. Hamilton Materials Inc,
- E. National Gypsum, www.national-gypsum.com
- F. Unimast Inc, www.unimast.com
- G. United States Gypsum Co, www.usg.com

PART 3 EXECUTION

3.1 INSTALLATION

- A. Interface With Other Work - Coordinate with Division 06 for location of backblocking for edges and ends of gypsum board and for blocking required for installation of equipment and building specialties. Do not install gypsum board until required blocking is in place.
- B. General - Install and finish as recommended in ASTM C 840 unless specified otherwise in this Section.
- C. Mounting Accessories
 1. Furring Channels - Apply with screws through flanges into each framing member.
- D. Gypsum Board
 1. General -
 - a. Install so trim and reinforcing tape are fully backed by gypsum board. No hollow spaces between pieces of gypsum board over 1/8 inch wide before taping are acceptable.
 - b. Rout out backside of gypsum board to accommodate items which extend beyond face of framing, but do not penetrate face of gypsum board, such as metal door frame mounting brackets, etc.
 2. Single Layer Application -
 - a. Apply ceilings first using minimum of two men.
 - b. Use board of length to give minimum number of joints.

- c. On walls over 108 inches high and on ceilings, apply board perpendicular to support.
 - d. Stagger end joints. End and edge joints of board applied on ceilings shall occur over framing members or be back blocked with 2x4 blocking. End joints of board horizontally applied on walls shall occur over framing members. Edge joints of board vertically applied on walls shall occur over framing members.
 - e. Butt edges in moderate contact. Do not force in place. Shim to level.
 - f. Leave facings true with joint, finishing flush. Vertical work shall be plumb and ceiling surfaces level.
 - g. Scribe work closely. Keep joints as far from openings as possible. If joints occur near an opening, apply board so vertical joints are centered over openings. No vertical joints shall occur within 8 inches of external corners or openings.
 - h. Install board tight against support with joints even and true. Tighten loose screws.
3. Fastening -
- a. Apply from center of board towards ends and edges.
 - b. Apply screws 3/8 inch minimum from ends and edges, one inch maximum from edges, and 1/2 inch maximum from ends.
 - c. Spacing -
 - 1) Ends - Screws not over 7 inches on center at edges where blocking or framing occurs.
 - 2) Wood Framed Walls and Ceilings - Screws 7 inches on center in panel field.
 - d. Set screw heads 1/32 inch below plane of board, but do not break face paper. If face is accidentally broken, apply additional screw 2 inches away.
 - f. Screws on adjacent ends or edges shall be opposite each other.
 - g. Drive screws with shank perpendicular to face of board.

E. Trim

- 1. Corner Beads -
 - a. Attach corner beads to outside corners.
 - 1) Attach metal corner bead with staples spaced 4 inches on center maximum and flat taped over edges of corner bead. Also, apply screw through edge of corner bead where wood trim will overlay corner bead.
 - 2) Set paper-faced trim in solid bed of taping compound.
- 2. Edge Trim - Apply where gypsum board abuts dissimilar material in accordance with Manufacturer's instructions. Hold channel and 'L' trim back from exterior metal window and door frames 1/8 inch to allow for calking.

F. Finishing

- 1. General -
 - a. Tape and finish joints and corners as specified below to correspond with

final finish material to be applied to gypsum board. When sanding, do not raise nap of gypsum board face paper or paper-faced trim.

- b. First Coat -
 - 1) Apply tape over center of joint in complete, uniform bed of specified taping compound. If metal corner bead is used, apply reinforcing tape over flange of metal corner bead and trim so half of tape width is on flange and half is on gypsum board.
 - 2) Completely fill gouges, dents, and fastener dimples.
 - 3) Allow to dry and sand lightly if necessary to eliminate high spots or excessive compound.
 - c. Second Coat -
 - 1) Apply coat of specified joint compound over embedded tape extending 3-1/2 inches on both sides of joint center. Use finishing compound only if applied coat is intended as final coat.
 - 2) Re-coat gouges, dents, and fastener dimples.
 - 3) Allow to dry and sand lightly to eliminate high spots or excessive compound.
 - d. Third Coat - Apply same as second coat except extend application 6 inches on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
 - e. Fourth Coat - Apply same as second coat except extend application 9 inches on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
2. Gypsum Board Finish Levels:
- a. Painted Smooth Gypsum Board Wall and Ceiling Surfaces, including Mechanical, Storage, And Utility Areas -
 - 1) GA-214-96 Level Four - All joints and interior angles shall have tape embedded in joint compound and shall be immediately wiped with a joint knife or trowel, leaving a thin coating of joint compound over all joints and interior angles. In addition, two separate coats of joint compound shall be applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compounds shall be smooth and free of tool marks and ridges. The prepared surface shall be covered with a drywall primer/sealer prior to the application of the final decoration.

3.2 CLEANING

- A. Remove from site all debris resulting from work of this Section including taping compound spills.

END OF SECTION 092900

SECTION 095100 ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide acoustical ceilings, complete, including elements of the suspension system, trim, and facilities for the support and attachment of lighting fixtures, air diffusers, grills and registers. (Refer to interior finish schedule and reflected ceiling plan for locations.)

1.2 SUBMITTALS

- A. Comply with Section 013300.
- B. Shop Drawings: Submit shop drawings indicating location of ceiling units and items of work which are to be coordinated with the ceilings, and framing and support details for all work supported by the suspension system.
- C. Samples: Prior to ordering, submit one 12" x 12" sample of each type of acoustical material and one sample each of main runner, cross tee, and wall molding specified for Architect's acceptance.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Performance: Fire, structural, and seismic performance meeting requirements of building code and local authorities. Acoustical performance based on project requirements.

PART 2 - PRODUCTS

2.1 ACOUSTICAL LAY-IN PANELS

- A. Approved Manufacturers:
 - 1. Armstrong
 - 2. Celotex
 - 3. CertainTeed
 - 4. Conwed
 - 5. USG Interiors
 - 6. Approved equal.
- B. Tile Types:

1. Type 1:
 - a. Style: Square edge.
 - b. Size: 24 by 24 inches by 5/8 inch.
 - c. Material: Mineral Fiber, Wet-formed.
 - d. Edge Detail: Square.
 - e. Type, Form, and Finish: ASTM E 1264, Type III, Form 2, Pattern C E, sag resist.
 - f. Fire Resistance: Class A, Type I, flame spread rating of 25 or less, smoke development rating of 0 to 450 or less.
 - g. Light Reflectance: 0.83.
 - h. Acoustics: CAC 35, NRC 0.50.
 - i. Insulation Value: Average R-Value of 1.6 at 75 degrees.
 - j. Weight: 0.75 lbs./sq. ft.
 - k. Color: White

2.2 SUSPENSION SYSTEM MATERIALS

C. Approved Manufacturers:

1. Armstrong
2. Chicago Metallic
3. Donn
4. National Rolling Mills
5. Approved equal.

D. Ceiling Grid Types:

1. Type 1:
 - a. Style: 15/16" Exposed Tee System.
 - b. Type: Exposed grid system, direct-hung double-web intermediate-duty system, ASTM C 635.
 - c. Fire Resistance: Class A, Type I, flame spread rating of 25 or less, smoke development of 0 to 450 or less.
 - d. Finish: Steel members, treated and protected against rust and corrosion and factory finished with baked on vinyl enamel, polyester or anodized.
 - e. Color: Selected by Owner from the manufacturer's standard colors.
 - f. Wall Molding: Provide wall molding, of types and profiles indicated, of same material and finish as suspension system.

E. Attachment Devices: Type recommended by suspension system manufacturer for attachment or anchorage of ceiling hangers to structure above ceiling, sized for not less than 5 times the hanger design load for the structural classification indicated.

F. Hanger Wire: Minimum No. 12 gauge, galvanized annealed steel wire. Provide seismic reinforcing as recommended by suspension system manufacturer for

compliance with local building codes.

2.3 MISCELLANEOUS MATERIALS

- A. Tile adhesive, staples, and sealant: Provide type recommended by manufacturer for specific project conditions.
- B. Hold-down clips, impact clips, and seismic compression bracing: Provide type recommended by manufacturer for compliance with local building codes.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install materials and suspension systems in accordance with manufacturer's instructions and recommendations, and ASTM C 636. Coordinate installation with location of mechanical and electrical work to ensure proper locations.
- B. Center locate system on room axis, leaving equally spaced border along perimeter. Lay directional patterned units one way with pattern parallel to longest room axis. Level ceiling to within 1/8" in 10' in both directions. Scribe and cut panels to fit accurately. Measure and layout to avoid less than half panel units unless otherwise indicated.
- C. Provide hold down clips at all units within 20 feet of an exterior door and locations indicated on drawings.
- D. Adjust, clean, and touch-up all system components.

END OF SECTION

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient stair accessories.
 - 3. Resilient molding accessories.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches (300 mm) long, of each resilient product color, texture, and pattern required.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

- A. Resilient Base:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Allstate Rubber Corp.; Stoler Industries.
 - b. Armstrong World Industries, Inc.
 - c. Burke Mercer Flooring Products; Division of Burke Industries, Inc.

- d. Endura Rubber Flooring; Division of Burke Industries, Inc.
- e. Estrie Products International; American Biltrite (Canada) Ltd.
- f. Flexco, Inc.
- g. Johnsonite.
- h. Mondo Rubber International, Inc.
- i. Musson, R. C. Rubber Co.
- j. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
- k. PRF USA, Inc.
- l. Roppe Corporation, USA.
- m. VPI, LLC; Floor Products Division.
- n. Approved equal.

B. Resilient Base Standard: ASTM F 1861.

- 1. Material Requirement: Type TS (rubber, vulcanized thermoset) or Type TP (rubber, thermoplastic).
- 2. Manufacturing Method: Group I (solid, homogeneous).
- 3. Style: Cove (base with toe).

C. Minimum Thickness: 0.125 inch (3.2 mm).

D. Height: 4 inches (102 mm).

E. Lengths: Cut lengths 48 inches (1219 mm) long or coils in manufacturer's standard length.

F. Outside Corners: Job formed or preformed.

G. Inside Corners: Job formed or preformed.

H. Finish: As selected by Architect from manufacturer's full range of standard finishes.

I. Colors and Patterns: As selected by Architect from full range of standard colors.

2.2 RESILIENT STAIR ACCESSORIES

A. Resilient Stair Treads:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - b. Endura Rubber Flooring; Division of Burke Industries, Inc.
 - c. Estrie Products International; American Biltrite (Canada) Ltd.
 - d. Flexco, Inc.
 - e. Johnsonite.
 - f. Mondo Rubber International, Inc.

- g. Musson, R. C. Rubber Co.
 - h. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
 - i. PRF USA, Inc.
 - j. R.C.A. Rubber Company (The).
 - k. Roppe Corporation, USA.
 - l. VPI, LLC; Floor Products Division.
 - m. Approved equal.
- B. Resilient Stair Treads Standard: ASTM F 2169.
- 1. Material Requirement: Type TV (vinyl, thermoplastic), Type TS (rubber, vulcanized thermoset), or Type TP (rubber, thermoplastic).
 - 2. Surface Design:
 - a. Class 1, Smooth (flat).
 - b. Class 2, Pattern: Raised-disc design, Raised-square design, Raised-chevron design, Raised-diamond design, Raised-rib design, or Raised-rib design with abrasive strips as indicated in the Room Finish Schedule.
 - 3. Manufacturing Method: Group 1, tread with embedded abrasive strips, or Group 2, tread with contrasting color for the visually impaired.
- C. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.
- D. Nosing Height: 1-1/2 inches (38 mm).
- E. Thickness: 1/4 inch (6 mm) and tapered to back edge.
- F. Size: Lengths and depths to fit each stair tread in one piece or, for treads exceeding maximum lengths manufactured, in equal-length units.
- G. Risers: Smooth, flat, toeless, height and length to cover risers; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
- 1. Thickness: 0.125 inch (3.2 mm).
- H. Stringers: Of same thickness as risers, height and length after cutting to fit risers and treads and to cover stair stringers; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
- I. Colors and Patterns: As selected by Architect from full range of standard colors.

2.3 RESILIENT MOLDING ACCESSORY

- A. Resilient Molding Accessory:
- 1. Manufacturers: Subject to compliance with requirements, 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:
 - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.

- b. Flexco, Inc.
 - c. Johnsonite.
 - d. R.C.A. Rubber Company (The).
 - e. Roppe Corporation, USA.
 - f. VPI, LLC; Floor Products Division.
 - g. Approved equal.
- B. Description: Reducer strip for resilient floor covering, Joiner for tile and carpet, Transition strips.
 - C. Material: Vinyl or Rubber.
 - D. Profile and Dimensions: As indicated in Room Finish Schedule.
 - E. Colors and Patterns: As selected by Architect from full range of standard colors.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
 - 1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), except that adhesive for rubber stair treads shall have a VOC content of 60 g/L or less.
 - 2. Adhesives 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. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.
- D. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.
- E. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

- B. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
 - 4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until they are same temperature as the space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.

3.3 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
 - 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.

2. Tightly adhere to substrates throughout length of each piece.
 3. For treads installed as separate, equal-length units, install to produce a flush joint between units.
- C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet or resilient floor covering that would otherwise be exposed.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
 1. Apply two coats.
- C. Cover resilient products until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Vinyl composition floor tile.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: Full-size units of each color and pattern of floor tile required.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 PROJECT CONDITIONS

- A. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- B. Close spaces to traffic during floor tile installation.
- C. Close spaces to traffic for 48 hours after floor tile installation.
- D. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore Standard.
- B. Low-Emitting Materials: Flooring system 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."

2.2 VINYL COMPOSITION FLOOR TILE

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Armstrong World Industries, Inc.
 - 2. Congoleum Corporation
 - 3. Mannington Mills, Inc.
 - 4. Tarkett, Inc.
 - 5. Approved equal.
- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth
- D. Thickness: 0.125 inch (3.2 mm)
- E. Size: 12 by 12 inches (305 by 305 mm).
- F. Colors and Patterns: As selected by Architect from full range of standard colors.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.
- C. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore Standard.
 - 1. Adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.
 - b. Rubber Floor Adhesives: Not more than 60 g/L.
 - 2. Adhesives 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."
- D. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install floor tiles until they are same temperature as space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.2 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply three coat(s).
- C. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 099000 - PAINTING AND COATING

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. General procedures and requirements for field-applied painting and coating.
- B. Related Sections
 - 1. Section 02 - Pavement Marking
 - 2. Section 05 - Shop priming of steel and iron
 - 3. Section 07 - Quality of Joint Sealants
 - 4. Section 09 - Priming of gypsum board before texturing
 - 5. Division 15 - Painting of mechanical identification, refrigerant line insulation, and duct interiors.

1.2 REFERENCES

- A. Master Painters Institute
 - 1. MPI (a), latest edition, 'Architectural Painting Specification Manual'
 - 2. MPI (r), latest edition, 'Maintenance Repainting Manual'

1.3 DEFINITIONS

- A. Gloss Levels
 - 1. Specified paint gloss level shall be defined as sheen rating of applied paint, in accordance with following terms and values, unless specified otherwise for a specific paint system.
 - a. Flat or Matte - 0 to 5 units at 60 degrees to a maximum of 10 units at 85 degrees.
 - b. Eggshell, Velvet, Or Low Luster - 5 to 25 units at 60 degrees to a minimum of 10 units at 85 degrees.
 - c. Satin - 20 to 35 units at 60 degrees.
 - d. Semi-gloss - 35 to 65 units at 60 degrees.
 - e. Gloss - 65 units and greater.
- B. Properly Painted Surface - Surface that is uniform in appearance, color, and sheen and free of foreign material, lumps, skins, runs, sags, holidays, misses, strike-through, and insufficient coverage. Surface free of drips, spatters, spills, and overspray caused by Paint Applicator. Compliance will be determined when viewed without magnification at a distance of 5 feet minimum under normal lighting conditions and from normal viewing position (MPI(a), PDCA P1.92).
- C. Damage Caused By Others - Damage caused by individuals other than those under direct control of Painting Applicator MPI (a), PDCA P1.92).

- D. Latent Damage - Damage or conditions beyond control of Painting Applicator caused by conditions not apparent at time of initial painting or coating work.

1.4 SUBMITTALS

- A. Submittals
 - 1. Submit two sets of color chips of paint colors and manufacturers proposed to match specified colors and manufacturers.
- B. Product Data
 - 1. Include following information for each painting system, arranged in same order as in Project Manual.
 - a. Manufacturer's cut sheets for each component of system indicating ingredients and percentages by weight and by volume, environmental restrictions for application, and film thicknesses and spread rates.
 - b. Manufacturer's substrate preparation instructions and application instruction for each painting system used on Project.
 - c. Confirmation of colors selected and that each area to be painted or coated has color selected for it.
 - 2. Provide two copies of Product Data submission, one copy to be kept on Project site and second copy to be included in Operations and Maintenance Manual.
- C. Samples - Provide two 4 inch by 6 inch minimum draw-down cards for each paint or coating color selected for this Project.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements - Paint and painting materials shall be free of lead and mercury and have VOC levels acceptable to local jurisdiction.
- B. Field Samples
 - 1. Before application of any paint system, if required by Architect, meet on Project site with Architect, Owner's representative, and Manufacturer's representative. Architect may select one surface for application of each paint system specified. This process will include establishing acceptable substrate conditions required for Project before application of paints and coatings.
 - 2. Apply paint systems to surfaces indicated by Architect following procedures outlined in Contract Documents and Product Data submission specified above.
 - 3. After approval of samples, proceed with application of paint system throughout Project. Approved samples will serve as standard of acceptability.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver specified products in sealed, original containers with Manufacturer's original labels intact on each container. Deliver amount of materials necessary to meet Project requirements in single shipment. Notify Architect two working days

before delivery of paint.

- B. Store materials in single place.
- C. Keep storage area clean and rectify any damage to area at completion of work of this Section. Maintain storage area at 55 deg F minimum.

1.7 PROJECT CONDITIONS

- A. Project Environmental Conditions
 - 1. Perform painting operations at temperature and humidity conditions recommended by Manufacturer for each operation and for each product.
 - 2. Apply painting systems at lighting level of 540 Lux (50 foot candles) minimum on surfaces to be painted. Inspection of painting work shall take place under same lighting conditions as application. If painting and coating work is applied under temporary lighting, deficiencies discovered upon installation of permanent lighting will be considered latent damage as defined in MPI Manual, PDCA P1-92

1.8 SCHEDULING

- A. Coordinate with other trades for materials and systems that require painting prior to installation.
- B. Schedule painting and coating work to begin when work upon which painting and coating work is dependent has been completed. Schedule installation of pre-finished and non-painted items, which are to be installed on painted surfaces, after application of final finishes.

1.9 MAINTENANCE

- A. Extra Materials - Provide painting materials in Manufacturer's original containers and with original labels in each color used. Provide one quart of each finish coat and one pint of each primer and of each undercoat in each color used. Label each can with color name, mixture instructions, date, and anticipated shelf life.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Materials used for any painting system shall be from single manufacturer unless approved otherwise in writing by painting system manufacturer. Include such approvals in Product Data submittal.
- B. Painting materials shall be pure, be compatible with other coating materials, bear identifying labels on containers, and be of highest quality of an approved manufacturer listed in MPI manuals. Tinting color shall be best grade of type recommended by Manufacturer of paint or stain used on Project.
- C. Manufacturers: Sherwin-Williams, Benjamin Moore, or approved equal.

- D. Paints and Coatings: Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- E. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

2.2 EXTERIOR PAINTED FERROUS METAL

- A. Gloss / Sheen Level Required - Semi-Gloss
- B. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
 - 1. Alkyd Systems - Gloss Finish
 - 1st Coat: Metal Primer (6 mils wet, 3 mils dry)
 - 2nd and 3rd Coat: Industrial Enamel

2.3 INTERIOR PAINTING

- A. Surfaces To Be Coated:
 - 1. Gypsum Board
 - 2. Ferrous Metal – Hollow Metal Door Frame
- B. SCHEDULE
 - 1. FERROUS METAL (Hollow Metal Door Frames & Misc. Metal)
 - a. Latex Systems – Gloss Finish
 - 1st Coat: Primer (2-4 mils dry).
 - 2nd Coat: Latex Gloss (4 mils wet, 1.5 mils dry per coat).
 - 3rd Coat: Latex Gloss (4 mils wet, 1.5 mils per coat).
 - 2. DRYWALL (Walls, Ceilings, Gypsum Board, etc.)
 - a. Latex Systems - Eg-Shel / Satin Finish
 - 1st Coat: Latex Primer (4 mils wet, 1.2 mils dry).
 - 2nd Coat: Latex Eg-Shel (4 mils wet, 1.6 mils dry per coat).
 - 3rd Coat: Latex Eg-Shel (4 mils wet, 1.6 mils dry per coat).

2.4 MATERIALS - GENERAL REQUIREMENTS

- A. Paints and Coatings - General:
 - 1. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. 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:

1. Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

2.5 ACCESSORIES

A. Coating Application Accessories:

1. Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Instructions to applicator to begin painting and coating work will indicate that substrates to receive painting and coating materials have been previously inspected as part of work of other Sections and are complete and ready for application of painting and coating systems as specified in those Sections.
- B. Before beginning work of this Section, examine, and test surfaces to be painted or coated for adhesion of painting and coating systems. Report in writing to Owner's Representative of conditions that will adversely affect adhesion of painting and coating work. Do not apply painting and coating systems until such adverse conditions are corrected by party responsible for adverse condition.
- C. Report defects in substrates that become apparent after application of primer or first finish coat to Owner's Representative in writing and do not proceed with further work on defective substrate until such defects are corrected by party responsible for defect.

3.2 PREPARATION

A. Protection

1. Remove rags and waste used in painting operations from building each night. Take every precaution to avoid danger of fire.
2. Protect other finish work and adjacent materials during painting. Do not splatter, drip, or paint surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following -
 - a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.
 - b. Keep cones of ceiling speakers completely free of paint. In all cases where painting of metal speaker grilles is required, paint without grilles mounted to speakers and without grilles on ceiling. On existing work where ceiling is to be painted, speakers and grilles are already installed, and ceiling color is not being changed, mask off metal grilles installed on ceiling speakers. If ceiling color is being changed, remove metal

grilles and paint, and mask off ceiling speakers.

B. Surface Preparation

1. Prepare surfaces in accordance with MPI requirements and requirements of Manufacturer for each painting system specified, unless instructed differently in Contract Documents. Bring conflicts to attention of Architect in writing.
2. Fill minor holes and cracks in wood surfaces to receive paint or stain.
3. Surfaces to be painted shall be clean and free of loose dirt. Clean and dust surfaces before painting or finishing.
4. Do no exterior painting while surface is damp, unless recommended by Manufacturer, nor during rainy or frosty weather. Interior surfaces shall be dry before painting. Moisture content of materials to be painted shall be within tolerances acceptable to Paint Manufacturer.
5. Sand woodwork smooth in direction of grain leaving no sanding marks. Clean surfaces before proceeding with stain or first coat application.

3.3 APPLICATION

- A. Paint or finish complete all surfaces to be painted or coated as described in Contract Documents, including but not limited to following items.
 1. Paint inside of chases in occupied spaces flat black for 18 inches or beyond sightline, whichever is greater.
- B. Apply sealant in gaps 3/16 inch and smaller between two substrates which are to be painted or coated.
- C. On wood to receive a transparent finish, putty nail holes in wood after application of stain using natural colored type to match wood stain color. Bring putty flush with adjoining surfaces.
- D. Exterior Metal Surfaces - Clean metal to be painted of rust, mill scale, grease, oil, and welding spatters, burrs, flux, slag, and fume. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying primer coat.
- E. In multiple coat paint work, tint each succeeding coat with slightly lighter color, but approximating shade of final coat to check application of specified number of coats. Tint final coat to required color.
- F. Spread materials smoothly and evenly. Apply coats to not less than wet and dry film thicknesses and at spreading rates for specified products as recommended by Manufacturer.
- G. Touch up suction spots after application of first finish coat.
- H. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.
- I. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.

- J. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.
- K. Finished work shall be a 'Properly Painted Surface' as defined in this Section.

3.4 ADJUSTMENT

- A. Correct deficiencies in workmanship required to leave surfaces in conformance with 'Properly Painted Surface' as defined in this Section. Correction of 'Latent Damage' and 'Damage Caused by Others,' as defined in this Section, is not included in work of this Section.

3.5 CLEANING

- A. As work proceeds and upon completion of work of any painting Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition. Remove debris caused by work of paint Sections from premises.

END OF SECTION 099000

SECTION 101423 SIGNAGE AND GRAPHICS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. ADA compliant exterior and interior signage with raised copy, Grade II Braille and borders.

1.2 SUBMITTALS

- A. Manufacturers shall submit 3 references showing comparable products for projects completed within the last 5 years.
- B. Manufacturer's Data: Submit manufacturer's descriptive literature and specifications, including color samples of material for review.
- C. Submit shop drawings listing sign styles, lettering and locations, overall dimensions of each sign and color chart.
- D. Submit manufacturer's standard warranty information.

1.3 REFERENCES

- A. Signage package shall meet the requirements of the Americans with Disabilities Act - 1990 Accessibility Guidelines for Buildings and Facilities and ANSI A117.1 – latest edition.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Approved Manufacturers:
 - 1. Best Manufacturing Sign Systems, www.bestsigns.com.
 - 2. APCO Graphics, Inc. (a.k.a. APCO Signs or APCO USA).
 - 3. Howard Industries, www.howardindustries.com.
 - 4. Or approved equal.

2.2 FABRICATION

- A. Signs shall be HC 300 ADA System with a four-in-one construction style having the following characteristics:
 - 1. Tactile characters/symbols shall be raised 1/32 inch from sign plate face. Signs shall be of one- piece construction; added-on and/or engraved characters are unacceptable.
 - 2. Text shall be accompanied by Grade 2 braille.
 - 3. 3/8" wide, 1/32" raised perimeter border with 1/8" inside radius typical.

4. All letters, numbers and/or symbols shall contrast with their background – either light characters on a dark background or dark characters on a light background. Characters and background shall have matte finish.

2.3 SIGNAGE

- A. Plaque material shall consist of melamine plastic laminate, approximately 1/8" thick (1/4" thick for slot signs), with background painted a contrasting color and rated non-static, fire-retardant and self-extinguishing. Plastic laminate will be impervious to most acids, alkalies, alcohol, solvents, abrasives and boiling water.
- B. Lettering style shall be Standard Medium, upper case, or other sans serif or simple serif typeface.
- C. Sizes of letters and numbers shall be as follows:
 1. Room numbers shall be 5/8" high.
 2. Lettering for room usage and directional identification shall be 5/8" high.
 3. Lettering for restroom identification shall be 5/8" high, symbols shall be 3" high.
- D. Letters and numbers shall be centered on sign.
- E. Grade 2 braille shall be placed directly below last line of letters or numbers, except for room number signs, where they shall be placed directly behind the last number.
- F. Radius corners: 1/2".

2.4 SIGN SIZE

- A. Size of signs shall be as shown on the drawings.

2.5 SIGN SCHEDULE

- A. Refer Sign Schedule and Details on the drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine installation areas to ensure that proper conditions exist for timely installation.

3.2 PREPARATION

- A. Verify that mounting locations and height for each sign will comply with ADA Accessibility Guidelines.
- B. Mounting locations should be smooth and free of all dirt, dust, grease, etc.

3.3 INSTALLATION

- A. Mount signs level and plumb using manufacturer's recommended standard mounting

hardware of vinyl foam tape or holes and screws.

- B. Remove excess adhesives, etc. from exposed sign surfaces as recommended by adhesive manufacturer. Clean sign surfaces as needed.

END OF SECTION 101423

SECTION 142400 - HYDRAULIC PASSENGER ELEVATOR

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. General Provisions of Contract, including general and supplementary conditions, special conditions and Division 1 Specification sections, apply to work of this section.
- B. Provide all labor, materials, services, and equipment necessary to complete the installation of the elevator as specified herein.
- C. Drawings and specifications are intended to show general arrangement, design, and extent of work. As such they are not intended to be scaled for roughed in measurements or to serve as shop drawings.
- D. Anything shown on drawings and not mentioned in these specifications or vice versa, as well as any work which is obviously necessary to complete the Project, within the limits established by the drawings, specifications and codes, although not shown on or described therein, shall be performed by the Contractor as part of their work.

1.2 DESCRIPTION OF WORK

- A. This section includes the installation of one (1) holeless plunger, hydraulic passenger elevator for the Project as follows and noted in the elevator schedule at the end of this section. The schedule indicates elevators to be provided, required performance, control, capacity, features, and finishes for the elevators.
- B. Hydraulic elevator is defined to include a plunger & cylinder unit connected to the elevator platform which will raise and lower the elevator by using pumping units using oil as the medium complete with components, controls and devices as indicated as required for safely operating elevator at rated speed and capacity.

1.3 SUBMITTALS

- A. Refer to Division 1 for additional information regarding submittals, including submittal requirements, processing procedures, and limitations of review.
- B. Pre-Construction Submittals: The following shall be submitted for review prior to manufacturing of equipment.
 - 1. Product Data: Submit manufacturer's technical product data and instructions for each principal component or product. List and describe features of control system, performances, and operating characteristics. Submit brochures of all signal and operational fixtures, control and drive equipment, hoistway door equipment, door operator, and door protective device.
 - 2. Shop Drawings: Shop drawings shall be prepared by skilled draftsmen and presented in a clear and thorough manner as follows:
 - a. Job-specific Elevator Layout Drawings: Drawings shall include dimensional layout drawings for the elevator, showing plans, elevations, sections, and large scale details of hoistway and machine room indicating service at each landing, coordination with

building structure, and relationships with other construction including, but not limited to, electrical and HVAC equipment. Indicate maximum dynamic and static loads imposed on building structure at points of support per the ASME A17.1 Safety Code for Elevators and Escalators. Indicate capacities, speeds, sizes, performances, operations, safety features, controls, finishes, and similar information on the layout drawings.

- b. Fixture drawings: Submit job-specific, straight line dimensional drawings of all signal and operational fixtures.
 - c. Car Enclosure: Submit job-specific plans, elevations, and details of car enclosure and finishes.
 - d. Hoistway Entrance: Submit job-specific plans, elevations and details of wall interface.
 - e. Approval of shop drawings is for general arrangement only and does not include measurement, which is the contractor's responsibility, or approval of variations from the contract documents. The purpose of the shop drawing submittals by the contractor is to demonstrate to the owner the contractor understands the design concept and demonstrates an understanding of the equipment and materials to be furnished.
3. Samples: Submit samples of exposed finishes of car enclosures, hoistway entrances, and signal equipment per Division 1 requirements. Provide 6" to 8" square samples of sheet materials and 10" to 12" lengths of running trim members.
4. Maintenance Certification: The Contractor shall submit a written certification, signed by the Contractor and the manufacturer of the equipment, making a commitment to provide direct support to the Owner, or the Owner's elevator maintenance service representative, including availability of parts (for inventory, not on an "exchange only" basis), diagnostic tools, and technical & engineering support. In addition, all parts and support shall be provided at a reasonable cost in line for which the original manufacturer would charge to its own customer base and response shall be in a timely manner. This commitment shall remain in effect for a minimum of twenty-five (25) years after substantial completion of the project.
- C. Post Construction Submittals: Prior to completion and acceptance of the project, the following shall be submitted for review and acceptance.
1. Diagnostic Device: Upon completion of work provide diagnostic testing device, or maintenance terminal, suitable for all troubleshooting and testing procedures related to the specific type of microprocessor control. This diagnostic testing device, or maintenance terminal, shall conform to the operating procedures under the testing section of these specifications. If onboard diagnostics are provided in the controller to meet this requirement, provide Adjustors Manual for proper interpretation of onboard diagnostics (see 1.3.C.2.b below).
 2. Maintenance Manuals: Submit job-specific bound manuals for each elevator or group of elevators. Submit the required number in hard copy plus a minimum of one (1) electronic copy in .pdf format.
 - a. Operating and maintenance instructions, lubricating schedule and instructions, parts listing, recommended parts inventory listing for motor and critical components, diagnostic device operations manual, emergency instructions and similar information. Include description of any manufacturer specific safety features that are beyond code requirements.

- b. The diagnostic device operations manual shall be complete with adjustment settings, sequence of operation, and other diagnostic technical data required for adjustments, tuning, maintenance, and operation of the elevators including performance of all required acceptance and periodic testing required by the Elevator Code. User's instruction manual shall include access codes required for accessing microprocessor equipment for adjusting or programming.
 - c. Detailed "Maintenance Control Program" - specific to the elevator as required by Elevator Code. The MCP shall be in place to maintain the equipment in compliance with Elevator Code. The MCP shall specify examinations, tests, cleaning, lubrication, and adjustments to applicable components at regular intervals and shall comply with Section 8.6.1 of the Elevator Code. The MCP shall include "On-Site Documentation" and a method for "Maintenance Records" and "On-Site Maintenance Records" as described in Elevator Code. One (1) hard copy of the "Maintenance Control Program," identical to the MCP provided in the Maintenance Manual, shall be placed for use in the elevator control room.
 - d. Wiring Diagrams: Complete electrical circuit diagrams for control and operational features as installed, showing location and wiring for power, signal and control systems. The diagrams shall differentiate clearly between manufacturer-installed wiring and field installed wiring.
3. On-Site Wiring Diagrams: Provide job-specific wiring diagrams located near the elevator controller in the elevator control room. Provide one (1) hard copy sized at 11" x 17" minimum, clear-laminated wiring diagrams.
 4. Keys: Provide a total of three (3) sets of keys for each type of key fixture on the elevator equipment. Keys shall be tagged with permanent marking, identifying function and use.
 5. Certificate Frame: Provide a certificate frame in the elevator machine room mounted in a conspicuous location. Frame shall be made of a quality metal with a window size to house the operating certificate from the State of Missouri.
 6. Certificates and Permits: Provide Owner with copies of all inspection/acceptance certificates and operating permits as required by governing authorities to allow normal, unrestricted use of elevator. If any variances are required from the State of Missouri for the product installed they shall be obtained by the Contractor. Provide a copy of any variances to the Owner upon completion of the project.

1.4 QUALITY ASSURANCE

- A. Installer Qualification: The elevator manufacturer, or a licensee of the manufacturer, who has a record of successful experience with the installation of similar elevators. The contractors shall have, as a minimum, the following qualifications and documentation verifying these qualifications shall be submitted prior to award:
 1. Minimum of five (5) years successful experience in installing and servicing similar elevator installations.
 2. Installed at least ten (10) completed and accepted elevator systems of similar size, scope, logic control, and motion control required by this contract.

3. An existing in-house administrative and technical organization staffed with competent personnel who are experienced in the elevator related work required to install and service the elevator system as specified.
- B. Elevator Code: Except for more stringent requirements as indicated or imposed by governing regulations (which must be complied with), comply with applicable requirements of the ASME A17.1-2016 Safety Code for Elevators and Escalators hereinafter referred to as the “Elevator Code” and the 2021 International Building Code, hereinafter referred to as the “Building Code”.
 - C. Seismic Requirements: Elevators are not required to meet the seismic requirements of Elevator Code section 8.4, based on a Seismic Design Category of C, an Building Importance Factor of 1.25 and the Spectral Acceleration at Short Period equal to 0.206.
 - D. NEC Code: Comply with the NEC Code and specifically with sections relating to electrical work for elevators.
 - E. Fire Resistance of Entrances: Comply with NFPA No. 80 and provide units bearing appropriate UL labels or other equivalent testing agency.
 - F. Accessibility Standards: Comply with the 2009 ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities. Comply with the 2010 ADA Standards for Accessible Design dated September 15, 2010.
 - G. Performance Requirements: Provide an elevator that meets the following performance requirements:
 1. Speed: +/- 5% of specified contract speed under a full load condition in either direction.
 2. Stopping Accuracy: 1/4 inch under any loading condition.
 3. Floor to Floor Performance Time: 17.0 seconds (based on a floor height of 12'-0") from start of doors closing until doors are 3/4 open and car is level and stopped at the next successive floor under any loading condition or travel direction.
 4. Door Close Time: 4.0 seconds.
 5. Door Open Time: 3.0 seconds.
 6. Door Open Dwell Time: 3.0 seconds car call / 5.0 seconds hall call. Dwell time shall be canceled upon activation of the door protection device or any car call button.
 7. Nudging: 60 seconds (adjustable and capable of turning on or off)
 8. Smooth acceleration and deceleration for comfort of ride.

1.5 INITIAL MAINTENANCE SERVICE AND WARRANTY

- A. Maintenance Service: Furnish maintenance and callback service on the elevator for a period of twelve (12) months following date of final acceptance of all elevator work as specified herein. The maintenance and call back service shall include at a minimum, but not be limited to, the full maintenance requirements as follows:
 1. Maintenance service shall be performed by skilled elevator personnel directly employed and supervised by the same company that furnished and installed the elevator equipment specified herein.
 2. This service shall include:
 - a. Monthly examination of the hydraulic unit as a minimum.

- b. Lubricating, adjusting, repairing and replacing of all parts as necessary to keep the equipment, including battery packs, in a first class condition and proper working order.
 - c. Furnish all lubricants and parts required.
 - d. Assure smooth and consistent operation of automatic hoistway doors and car doors.
 - e. Assure smooth starting and stopping and accurate leveling at all times.
 - f. Provide all periodic annual and maintenance testing in accordance with the Elevator Code.
 - g. The contractor shall keep clean of all dirt and debris guide rails, top of car, bottom of platform, machine room, unit hoistway and pit. All necessary cleaning supplies and equipment shall be furnished by the contractor.
 - h. An annual inspection, as described in the Elevator Code and/or as required by governing authorities, in the eleventh (11th) month of the new installation maintenance period.
3. The maintenance service shall not include the performance of any work required as a result of improper use, accidents or negligence, for which the contractor is not directly responsible.
 4. All work shall be completed by trained employees of the elevator contractor and performed during normal working hours. Include 24 hour/day, 7 days/week emergency callback service. Owner is responsible for the difference between straight time cost and overtime cost of said callbacks. Exclude only repair/replacement due to misuse, abuse, accidents, or neglect caused by persons other than installer's personnel. Emergency callbacks shall be of highest priority.
 5. The contractor shall maintain a log in the elevator machine room. The log shall list the date and time of monthly examinations and all trouble calls. Each trouble call shall be fully described including the nature of the call, necessary corrections performed and or parts replaced.
 6. The contractor shall maintain a log in the elevator machine room. The log shall list the date and time of routine examinations and all trouble calls. Each trouble call shall be fully described including the nature of the call, necessary corrections performed and or parts replaced.
 7. Maintenance service shall conform to the requirements of Section 8.6 of Elevator Code. This shall include the provision of a written Maintenance Control Program and maintenance record keeping that is consistent with Elevator Code requirements.
- B. General Warranty: The elevator warranty specified in this section shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- C. Warranty: Provide special project warranty, signed by contractor, installer, and Manufacturer, agreeing to replace, repair/restore defective materials and workmanship of elevator work during warranty period. "Defective" is hereby defined to include, but not by way of limitation, operation or control system failures, performances below required minimums, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected and unsatisfactory conditions. The warranty period is twelve (12) months starting on date of final acceptance of the elevator and shall be extended until "defects" as defined in this warranty are corrected.

PART 2 MATERIALS AND COMPONENTS

2.1 GENERAL

- A. Provide manufacturer's base pre-engineered elevator system with modifications or added features that will comply with the elevator work requirements as specified herein or, at manufacturer's option, provide custom manufactured base elevator system that will comply with the requirements. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard pre-engineered elevator systems, and as required for a complete system.
1. Otis - Hydrofit (with machine room only)
 2. TK Elevator - Endura (with machine room only)
 3. MEI
 4. Canton Elevator
- B. The elevator systems listed above shall be included in the project bid and modified to meet the requirements specified herein. Any other products by the same manufacturers or others shall undergo the specified substitution request process prior to bid. Any system that is not listed above or is not approved prior to the bid date will not be accepted.

2.2 ELEVATOR MACHINERY AND CONTROL EQUIPMENT

- A. Hydraulic Power Unit: The pumping unit shall be of integral design and shall include an electric motor connected to a pump, a hydraulic control system, storage tank, necessary piping connections, and a controller, all compactly designed as a self-contained unit. The pumping unit shall be located in the elevator machine room and the controller shall be mounted on the end of the machine or mounted on the wall of the machine room to meet NEC working clearance requirements. The hydraulic power unit shall be securely fastened to the machine room floor to prevent the tank from being overturned or displaced. Elevator contractor shall verify location and dimensions in general layout of machine room.
1. The hydraulic control system shall be a compact design suitable for operation under the required pressures and it shall be mounted in the storage tank. The control valve will be a manifold type with up, down and check valve sections. A control section including solenoid valves will direct the main valve and control up and down starting, transition from full speed to leveling speed, up and down stops, pressure relief and manual lowering. Down speed and up and down leveling shall be controlled at the main valve sections. All of these functions shall be fully adjustable for maximum smoothness and to meet contract conditions. All control systems shall be pre-adjusted at the factory. A manual lowering feature shall be provided to permit lowering the elevator at slow speed in the event of power failure or for adjusting purposes.
 2. The pump shall be a positive displacement screw type to give smooth operation and shall be especially designed and manufactured for elevator service.
 3. The motor shall be of the submersible alternating current, poly-phase squirrel cage induction type with solid-state, reduced starting current and shall be of a design especially adapted to electro-hydraulic requirements.
 4. The storage tank shall be constructed of steel and shall be provided with a removable cover and a means to gauge the proper level of the oil. The pump and submersible motor shall be mounted on a special reinforced isolation mount in the bottom of the tank. The control valve

shall be mounted in the discharge line above the oil level and easily accessible from the top of the tank. An initial supply of oil sufficient for proper operation shall be provided.

5. Provide a muffler in the discharge oil line near the pump unit designed to dampen and absorb pulsation and noise in the flow of hydraulic fluid.
 6. Provide a manual shut off valve in the supply line adjacent to the pump unit.
- B. Cylinder & Plunger (Jack Unit): All jack units shall be single-stage. Jack units shall not be inverted. The cylinder shall be constructed of steel pipe of sufficient thickness and suitable for the operating pressure per the Elevator Code. The top of the cylinder shall be equipped with a cylinder head with drip ring to collect any oil seepage as well as an internal guide ring and self-adjusting packing.
1. The plunger shall be constructed of selected steel tubing or pipe of proper diameter machined true and smooth with a fine polished finish. The plunger shall be provided with a stop ring electrically welded to it to prevent the plunger from leaving the cylinder. The plunger and cylinder shall be installed plumb and must operate freely with minimum friction. The plunger shall be securely mounted to the car frame and be isolated from the frame to eliminate any vibration from the jack unit to the car frame.
 2. Pipe of adequate size and thickness shall be installed between the pumping unit and the cylinder head. Any piping running between a remote elevator machine room and the respective elevator hoistway shall be welded or threaded. All piping shall be installed above ground through the path as determined by the architect.

C. Controller:

1. A microprocessor computer based control system shall be provided to perform all of the functions of safe elevator motion and elevator door control and shall be one of the following control systems or approved equal:
 - a. Motion Control Engineering – Motion 2000 (with onboard diagnostic keyboard and display)
 - b. Vertitron Midwest Inc. - VHC-102
 - c. Otis - Elevonic (with one Diagnostic Tool per Group and Adjustors Manual)
 - d. TK Elevator - TAC32 (with one Diagnostic Laptop per Group OR onboard Diagnostic Tool and Adjustors Manual)
 - e. Smartrise - Hydraulic Controller
2. The controller shall be designed with a split cabinet to separate high voltage from low voltage for efficiency and safety of future maintenance and troubleshooting of the unit.
3. The controller shall include all the hardware required to connect, transfer, and interrupt power and protect car operational and group supervisory control. A three-phase overload device shall be provided to protect the motor against overloading.
4. Identify each device, module and fuse (with ampere rating) by name, letter, or standard symbol, in an indelible and legible manner on the device or panel. Coordinate identification markings with identical markings on wiring diagrams. Use light emitting diodes (LED) for visual monitoring of individual modules. Components shall have interlocking circuits to assure fail-safe operation and to prevent unwarranted elevator movement should any component fail to function properly. Modules shall be of the type that plug into pre-wired

- mounting racks. Field wiring or alteration shall not be necessary in order to replace defective modules.
5. The elevator shall be provided with an automatic leveling device that will bring the car to a stop within $\frac{1}{4}$ " of the landing level regardless of load or direction of travel. Landing level will be maintained within the leveling zone irrespective of the hoistway doors being open or closed.
 6. A protective circuit shall be provided which will stop the motor and the pump and return the car to its lowest landing in the event that the car while traveling up, does not reach its designated landing within a predetermined time interval. This circuit shall permit a normal exit from the car but prevent further operation of the elevator until the trouble has been corrected.
 7. Solid state, reduced current starting shall be furnished which shall limit both the initial starting current and peak current drawn by the motor.
 8. The control equipment and hydraulic power unit enclosures shall be mechanically fastened to the machine room floor.
 9. Design the system so that it will start properly when power is restored in the event of a power failure. Provide system memory so that data is retained in the event of power failure or disturbance.
 10. The controller shall be rated for a minimum of 10,000 SCCR.
 11. Provide manufacturer's standard pre-engineered microprocessor system, which shall control car movements as a simplex collective operation. Provide automatic dispatching of the car in response to hall calls with automatic response of system to changes in demand.
 12. A car control station shall be furnished for the elevator and shall contain a bank of buttons numbered to correspond to the landing served. At each terminal landing a single push button fixture shall be provided containing the appropriate up or down push button.
 13. When a call is registered by momentary pressure on a car or landing button, that button shall become illuminated and remain illuminated until the call is answered. Illuminated buttons serve as a visual indication that a call has been registered and that the car will stop at that landing.
 14. Operation shall be automatic by means of the car and landing buttons. Stops registered by the momentary actuating of the car and landing buttons shall be made in the order in which the landings are reached in each direction of travel after the buttons have been actuated. All stops shall be subject to the respective car or landing button being actuated sufficiently in advance of the arrival of the car at the landing to enable the stop to be made. The direction of travel for an idle car shall be established by the first car or landing button actuated.
 - a. "UP" landing calls shall be answered while the car is traveling in the up direction and "DOWN" landing calls shall be answered while the car is traveling in the down direction. The car shall reverse after the uppermost or lowermost car or landing call has been answered, and proceed to answer car calls and landing calls registered in the opposite direction of travel.

- b. When the car, without registered calls arrives at a floor where both the "UP" and "DOWN" calls are registered, it shall initially respond to the hall call in the direction that the car was traveling. When no car call or hall call is registered for further travel in that direction, the car shall close its doors and immediately reopen them in response to the hall call in the opposite direction. The hall lantern shall indicate the changed direction when the doors reopen.
15. A diagnostic testing device, or maintenance terminal, suitable for all troubleshooting and testing procedures related to the specific type of microprocessor control, shall be installed on this project and provided at the final acceptance. This diagnostic testing device, or maintenance terminal, shall conform to the operating procedures under the testing section of these specifications.
- a. After successful testing of the diagnostic device, in conjunction with the microprocessor control, the testing device shall become the property of the Owner. The diagnostic testing device shall not become inoperative after a period of time requiring factory rehabilitation. The contractor shall provide written certification that repair and support of the diagnostic tool components is readily available to the Owner in the future.
 - b. When repairs or replacement to the testing device become necessary prior to the final acceptance, the repairs, or replacement, shall be provided at no cost to the Owner.
16. Additional special operations shall be included with the elevator control system:
- a. Independent Service: A key switch shall be provided in the car operating station of the elevator which, when actuated, shall disconnect the elevator from the hall buttons and permit operation from the car buttons only. Close doors by constant pressure on desired destination floor button. Open doors automatically upon arrival at selected floor.
 - b. Top of Car Inspection Operation: Provide an operating fixture on top of the car containing continuous pressure "Up" and "Down" buttons for operating the elevator, an emergency stop button, a light and duplex GFCI receptacle, and a toggle switch that will make the top of car operating device operative.
 - c. Fireman's Emergency Service: Furnish emergency operation to return the elevator to the main fire access Floor LL and return to the alternate Floor I when emergency is at main fire access floor. Furnish "in car" control of the elevator during emergency operation by means of a key switch in the car.
 - 1) The appropriate signals from the fire alarm control system, as required to work in conjunction with the fireman's phase I recall operation, shall be provided in the machine room by other sections. Coordinate exact signal requirements with fire alarm contractor to ensure proper operation and code compliance.
 - d. Emergency Communications System Failure Verification: For each elevator group, provide a means to verify operability of the telephone line, or other means of connection, serving the respective elevator group's emergency two-way communications system. This system shall verify telephone line operability on a daily basis and provide for a visual and audible alarm when the system determines that the telephone line is not functioning. The audible and visual alarm shall be located near the firemen's emergency service phase I key switch. The visual signal shall be an intermittent jewel illumination that shall not extinguish until the telephone line is functional. The audible signal shall be 10 dBA above ambient noise, but shall not exceed 80 dBA, as measured from the phase I

recall key switch location. The audible alarm shall sound until authorized personnel silence it or until the telephone line is made functional. The means to silence the alarm shall be accessible only to authorized personnel. This system shall meet Elevator Code requirements.

- e. Hoistway Access Key Switch Operation: Key operated switches shall be provided in the car and at the top landing for selecting hoistway access operation. When the inspection switch in the car is turned to the "ON" position, the car is put on inspection operation and can only be run by use of the switch at the top landing.
 - 1) The car parks with the doors open and the closing circuit rendered inoperative. The inspector runs the car at low speed with the doors open by constant operation of the switch located in the elevator lobby.
 - 2) The car can be run down from the top floor to gain access to the top of the car. The movement of the car initiated and maintained by the upper access switch shall be limited in the down direction to a travel not greater than the height of the car crosshead above the car platform, and limited in the up direction to the distance the platform guard extends below the car platform.
 - 3) The car can be run up from the bottom landing to gain access to the pit. Travel is limited in the up direction by hoistway limit switches so that the maximum travel is the point where the bottom of the platform guard is even with the hoistway entrance header.

2.3 CAR STRUCTURE

- A. Platform: The car platform shall be framed in steel with fire-resistant, marine-grade wood decking. The platform shall be equipped with extruded aluminum sills. The entire platform shall rest on a rubber pad, so designed as to form an isolation cushion between the platform and the plunger. The platform shall be provided with a toe guard and be protected with suitable fire retardant material to comply with the Elevator Code.
- B. Car Frame: A separate, suitable car frame fabricated from formed or structural steel members shall be provided with adequate bracing to support the platform and car enclosure. Car frame components shall not be integral with the cab enclosure.
- C. Car Guides: Provide adjustable guide assemblies to guide the car on the rails. The guides shall be provided with replaceable inserts/wheels and shall be of a design to withstand the loads and capacity of the elevator. The assemblies shall be properly adjusted and aligned with the rails to provide a smooth quality of ride upon completion of the installation.
- D. Top of Car Handrail: A standard railing, consisting of a top rail, intermediate rail, posts, and toe-board, shall be provided on the top of each elevator car where required by code. The top rail shall have a smooth surface and the upper surface shall be located at a vertical height of 42" from the top of the car. The intermediate rail shall be located approximately half-way between the top rail and the top of the car. Posts shall be located not more than 7'-10" apart. The toe-board shall be securely fastened to the posts and extend from the top of the car to a height not less than 4".
- E. Balance: After all components are assembled on the car structure, the elevator car shall be statically balanced in alignment with the guide rails to equalize pressure on the roller guides for a smooth ride upon completion of the installation.

2.4 HOISTWAY COMPONENTS

- A. Guide Rails: The elevators shall be furnished with steel elevator guide rails to guide the car. Rails shall be solid steel T-shaped rails or formed Omega-shaped rails. The rails shall be erected plumb and securely fastened to the building structure.
1. Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is required by other sections.
 2. Where elevator manufacturer requires a maximum rail bracket spacing dimension that is less than the distance between floor beams depicted on the Structural/Architectural drawings, elevator manufacturer shall include channel backing designed and installed by the elevator installer in this section.
 3. Where elevator manufacturer requires a maximum rail bracket spacing dimension that is less than the distance between floor beams depicted on the Structural/Architectural drawings, elevator manufacturer shall include channel backing designed and installed by the elevator installer in this section.
- B. Hoistway Operating Devices: Normal terminal stopping devices shall be provided. When an emergency terminal speed-limiting device is furnished, the controller switches and circuitry shall be arranged in accordance with the requirements of the Elevator Code.
- C. Pit Switch: An emergency stop switch shall be located in the elevator pit within reach of the pit access door and 18 inches above the sill.
- D. Top of Car Operating Device: A top of car operating device shall be provided and shall have the proper buttons, switches, and stop switch to operate the elevator on top of the car under inspection operation. The device shall be provided with a GFCI duplex receptacle and a guarded light providing 10 foot candles of illumination at any maintainable point on the car top.
1. If the stop switch on the top of car operating device is not within reach of the hoistway landing, a second stop switch shall be provided on the car top that is within reach of the hoistway landing.
- E. Wiring: All wiring and electrical interconnections shall comply with the governing codes. Insulated wiring shall have flame retardant and moisture-proof outer covering, and shall be run in conduit, tubing or electrical wireways.
- F. Traveling Cable: Traveling cables shall be flexible, with a flame and moisture resistant outer cover, and shall be suspended to relieve strain on individual conductors. Include the required number in addition to three (3) spare sets of shielded communication wires and car lighting circuits from the machine room to the car connection points on the elevator. Provide 10% spare wires in traveling cable.
- G. Spring Buffers: Spring buffers shall be installed in the elevator pit as a means for retarding the movement of the car at the bottom limits of travel. Solid bumpers and polyurethane buffers are not acceptable.

2.5 DOOR OPERATING SYSTEM

- A. Door Operator: Doors on the car and at the hoistway entrances shall be power operated by means of a high speed, heavy duty, closed-loop, master door operator mounted on top of the car. The motor shall have positive control over door movement for smooth operation.
 - 1. Door operation shall be automatic at each landing with door opening being initiated as the car arrives at the landing and closing taking place after expiration of a time interval. A car door electric contact shall prevent starting the elevator away from the landing unless the car door is in the closed position. Door close shall be arranged to start within a time consistent with accessibility requirements.
 - 2. The time interval for which the elevator doors remain open when a car stops at a landing shall be independently adjustable for response to car calls and response to hall calls.
- B. Interlocks: An approved positive interlock shall be provided for each hoistway entrance which shall prevent operation of the elevator unless all doors for that elevator are closed and shall maintain the doors in their closed position while the elevator is away from the landing.
 - 1. Hoistway door unlocking devices shall be provided at all hoistway landings to permit access to the top of the car and pit areas. The unlocking devices shall be actuated by a special key and access holes in hoistway doors shall be protected by a naturally finished, barrel type escutcheon plate.
- C. Car Door Safety Device: A proximity type, non-contact, infrared ray, door reversal device shall be furnished for the elevator entrance. Operation for all devices to be as follows:
 - 1. The doors shall be prevented from closing from their full open position if a person or object comes within the zone of detection. The detection zone shall move with the doors and if a person or object enters the zone as the doors are closing, the doors shall reverse and reopen prior to physical contact. The doors shall reclose after a minimal time interval. After a stop is made, the doors shall remain open for a time interval to permit passenger transfer, after which the doors shall close automatically. This interval shall be less for a car call stop than for a hall call stop or a coincident car/hall call stop.
 - 2. If the doors are prevented from closing for a fixed time period an audible chime shall sound on the car. When the object is removed from the zone of detection the doors shall close at reduced power and speed to below 2 1/2 ft.-lbs. of kinetic energy. If an object enters the zone of detection while the doors are closing at reduced power and speed the doors shall stall and not reopen. Once the object is removed from the zone of detection the doors will continue to close at reduced power and speed. This operation will continue until the doors are totally closed. Normal operation shall resume at the next landing reached by the car.
- D. Car Door Restrictors: The door operating mechanism shall be arranged so that the car and hoistway doors cannot be opened by hand more than four inches from within the elevator car when the car is outside the unlocking zone. Design of door restricting mechanism shall permit opening of car doors from outside of the elevator car without the use of special tools. Only mechanical type door restrictors are permitted.

2.6 OPERATIONAL FIXTURES

- A. Car Control Station: A single car control station panels shall be applied to the front return panel of the elevator car or integral with the swing return. The panel or swing return shall be provided with a concealed, heavy-duty hinge to swing the panel open for maintenance and inspection access.

1. The car control station panel shall contain a bank of mechanical illuminated buttons and Braille marked to correspond to the landings served and contain an illuminated alarm bell, door open & close buttons, fireman's phase II service key & fixtures, key switches for lights, fan, and other controls required for specified car operation and control. Mount the panels at height to comply with accessibility standards. Floor buttons shall be positioned in a single column. Braille plates shall not be the same shape as the floor call buttons.
2. The car control station panel for each elevator shall incorporate the fireman's phase II key switch and associated fire operation fixtures inside a locked cabinet located at the upper portion of the panel. The fireman's keyswitch shall be of a tubular, 7 pin, style 137 construction and shall have a bitting code of 6143521. The key shall be coded "FEO-K1." The phase II key switch, instructions, call cancel button, fire jewel, door open and door close buttons, and stop switch shall all be located within this locked panel. The front of the cabinet shall be engraved with the label "FIREFIGHTERS' OPERATION". The cover to the cabinet shall be openable with the same key that is used to operate the phase II key switch. This cabinet shall meet Elevator Code requirements.
3. A digital car position indicator with direction arrows shall be provided in the top of the car control station panel. The position of the car in the hoistway shall be shown by the illumination of the indication corresponding to the landing at which the car is stopped or passing. Provide an electronic, adjustable, floor bypass tone to indicate to passengers that car is stopping at a particular floor served.
4. The elevator number shall be permanently engraved at the top of the main car control station panel. The car capacity shall be permanently engraved directly on the lower portion of the main car control station panel. At the contractor's option, an inset panel at described location is acceptable. Lettering shall not be less than 1/2" high and shall be black filled.
5. The car control station panel shall also contain emergency car lights and the emergency power unit employing a sealed rechargeable battery and static circuits, or a portion of the cab ceiling lights shall be made to work on a similar emergency power unit. The battery shall be 6-volt minimum, sealed, maintenance free, of either lead acid or gel cell construction, and designed to give a life expectancy of not less than 5 years. Illumination for the elevator car and power for alarm bell shall be provided in the event of power failure.
6. Car control station shall not contain plastic or polycarbonate components, labels or frames.
7. The car control station shall also contain an integral speakerphone located at ADA/accessibility height requirements. Provide operating switches with manufacturer's standard identification for required use or function. The activation button shall match the car operating panel button fixtures. The speaker shall be mounted behind the car operating panel with vandal resistant perforations drilled through the car operating panel.
 - a. The speakerphone shall be of the automatic dialing type and shall have the capability to automatically identify its location upon receipt of the call to the party answering the call.
 - b. Provide an activation button, with integral legend, and identification plate adjacent to the button. Illuminate button to indicate call registration. Provide means to indicate when call is answered. Provide engraved legend below indicator light explaining phone instruction. The speakerphone shall meet the requirements of ADA guidelines and shall operate in accordance with Elevator Code.

- c. Necessary shielded wires shall be provided by the contractor from the speakerphone in the elevator car, through the traveling cables, and shall terminate in a junction box on the elevator controller in the elevator machine room. Connections to the building service system shall be provided by the Contractor.
- B. Hall Push Button Station: The elevator shall be provided with a single riser of hall button fixtures. At each terminal landing, single type button fixtures shall contain the appropriate "Up" or "Down" buttons. All fixtures shall be installed at proper height to comply with the accessibility standards. The hall button fixture faceplates shall be the flat, applied type that is flush mounted with the wall. The hall buttons shall operate such that when a call is registered by any momentary pressure on the landing button, the button shall become illuminated and remain illuminated until the call is answered.
1. The call buttons in the hall button fixture shall be centered at 42" above the finished floor. Assure there is space between the actual hall buttons and any other items on the fixture to avoid any confusion as to which button is the hall call button.
 2. The face plate of the Floor LL hall button shall additionally contain the fireman's phase I key switch. The fireman's keyswitch shall be of a tubular, 7 pin, style 137 construction and shall have a bitting code of 6143521. The key shall be coded "FEO-K1." The fireman's phase I instructions shall be permanently engraved on the face plate or on an inset plate mechanically fastened flush with the face of the hall button fixture.
 3. The faceplate of the Floor LL hall button shall additionally contain the audible and visual alarm for the elevator group's "Emergency Communications System Failure Verification" in addition to the keyswitch for temporary silence of the alarm.
 4. The hall button at the top and bottom landings shall contain the hoistway access key switch to activate Hoistway Access Operation.
- C. "In-Car" Hall Lantern: An in-car hall lantern shall be located in the car entrance jamb at the ADA/accessibility required height. The lantern shall be the applied type with a flush-mounted faceplate and shall be on the side of the entrance opposite the hall button location. The lantern shall incorporate the appropriate triangular direction arrows for the up and down directions. The operating function of the lantern shall incorporate the appropriate directional tones per accessibility standards. An adjustable, electronic, audible tone shall sound to announce the arrival of the elevator car. The tone shall sound once for the "UP" direction and twice for the "DOWN" direction upon opening of the car doors.
- D. Fixtures: The hall lantern and position indicators shall be of the standard digital type. All other newly provided fixtures shall be of the vandal resistant type. All newly provided fixtures shall be constructed of stainless steel with a no. 4 satin grain finish. Vandal resistant screws shall be provided for mounting all signal and operational fixture face plates. Fixtures shall be as manufactured by the following or approved equal:
1. Otis - M3 Vandal Resistant
 2. TK Elevator - Vandal Resistant with V2 Buttons
 3. Innovation - Bruiser Line

2.7 CAR ENCLOSURE

- A. The elevator cab shall be a steel shell cab. The elevator cab side and rear walls shall consist of formed rigidized stainless steel panels, bolted together to form a complete steel shell cab. Cab

shell panels shall be a maximum of 24" wide and made of a minimum of 16 gauge rigidized stainless steel (or, at Contractor's option, provide 14 gauge rigidized stainless steel with a maximum panel width of 36"). Panels shall be provided with sound deadening exterior matting. Rigidized stainless steel shall have a 5WL pattern with a satin finish. The clear inside height of the cab shell shall be the manufacturer's standard 8'-0" cab.

- B. The front return panel shall incorporate an integral entrance column, shall be brushed stainless steel a minimum of 16 gauge, and shall extend from finished floor to underside of fascia. The strike jamb shall also be stainless steel a minimum of 16 gauge. The front return panel shall be arranged for mounting the car control station panel. A full width fascia of brushed stainless steel shall be furnished over the return panel and car entrance.
- C. The car top shall consist of a panel which shall be clad with sheet metal and contain a hinged top emergency exit panel 17" x 24", or code compliant equal. The car top material shall be a minimum of 12 gauge steel suitably reinforced with matte white painted finish.
 - 1. Provide an interlock on the top of car emergency exit that will prevent operation of the elevator car if the exit cover is open more than 2". Interlock shall be designed in accordance with code requirements.
 - 2. The ceiling shall be furnished with a concealed suspended frame supporting individual wood-core panels incorporating a brushed stainless steel finish on the exposed surfaces. Each panel shall contain a down light fixture with LED bulbs. A dimmer switch shall be provided on the car top to adjust the car lighting in the elevator car.
 - 3. A two-speed fan shall be mounted in the car top above the ceiling. Mount with rubber grommets and adjust for smooth, quiet operation. Fan shall be Morrison Model OE or approved equal.
- D. The car entrance shall be provided with a single-speed, side-opening car door with a brushed stainless steel facing on the car side suitably reinforced with applied hangers with track. The door shall be of hollow metal construction. Hangers shall be of the sheave type, two sheaves per door, rotating on a precision ball bearing. The roller shall be on an eccentric stud to provide adjustment. Car doors shall be provided with two phenolic gibs per car door panel.
- E. The car sills shall be installed such that the platform is recessed below the car door sill to accept the car flooring so the flooring is flush with the car door sill upon completion of the installation. The car flooring shall be VCT as indicated on the drawings and specified in Division 9. Exact flooring and subflooring thicknesses to be verified by contractor with flooring manufacturer.
- F. A stainless steel handrail shall be furnished on the rear wall of the elevator cab and shall be mounted such that the top of the handrail is 34" above the finished floor. The handrail shall be a minimum of 1/4" by 2" square and the ends shall return back to the cab walls. Provide one continuous handrail on each wall.
- G. The car enclosures shall comply with the ASME A17.1 Safety Code for Elevators and Escalators. All stainless steel shall be provided with #4 brushed finish.

2.8 HOISTWAY ENTRANCES

Passenger Elevator Entrance Summary

Total Number -

Two (2)

Type-
Clear Opening
Door Panel Finish
Jamb Finish

Side Opening, Single Speed
3'-6" W by 7'-0" H
Brushed Stainless Steel
Brushed Stainless Steel

- A. Frames: Stainless steel frames shall be of bolted construction for a one-piece unit assembly comprised of head and side jamb sections. All frames shall be securely fastened to sills and header and shall be a minimum of 16-gauge sheet material. The frames shall have the profile and depth to accommodate the wall system as shown on drawings.
- B. Sills: Extruded aluminum sills shall be provided with non-slip wearing surfaces and grooves for door guides. Sills shall be supported on steel angles furnished and installed by the contractor in this section.
- C. Fascia Plates: Fascia plates between floors shall be fastened to the header and sill above. All fascia to be galvanized or painted steel.
- D. Toe guard: A toe guard shall be furnished at the lowest landing. Toe guard to be galvanized or painted steel.
- E. Dust Cover: A dust cover shall be furnished at the highest landing. Dust cover to be galvanized or painted steel.
- F. Headers: Headers of sufficient size and thickness to provide support for the frame and hangers shall be securely fastened to the strut angles and shall include integral hangers.
- G. Struts: Strut angles shall be of sufficient size to support the entrance and shall be securely fastened to the building structure.
- H. Hangers: Hangers shall be of the sheave type, two sheaves per door, rotating on a precision ball bearing shall be provided. The roller shall be on an eccentric stud to provide adjustment. Hangers shall be applied or integral on the top of the doors. Hanger fascia dust covers shall be provided over all hangers and shall be galvanized or painted steel.
- I. Closers: Provide closers on all hoistway entrances and adjust to automatically close the hoistway doors when the car is away from the landing per Elevator Code requirements.
- J. Doors: Provide steel hollow metal doors of the size and type indicated in elevator schedule, fabricated from steel sheet material with vertical internal channel reinforcements spaced at not more than 6" on centers and welded to face sheets. Panels shall be provided with a stainless steel finish on the lobby side. Bottom of doors shall be provided with two (2) removable phenolic guides per door panel, which run in the sill slots with minimum clearance. The door panels shall be furnished with barrel type, naturally finished, escutcheon plates for the door unlocking devices at each landing.
 - 1. Hoistway doors shall be manufactured in accordance with the procedure established by Underwriters Laboratories and shall be so labeled. Four-inch decals indicating floor identification shall be applied on the hoistway side of the hoistway door panels.
 - 2. Steel sight guards shall be furnished on the leading edge of the doors to conceal the hoistway beyond the doors. Finish to match door panels.

- K. Handicap Jamb Markings: Provide stainless steel jamb marking plates with raised floor markings, a black background, and braille to identify each landing on both jambs of each hoistway entrance. Jamb marking plates shall be mechanically fastened to the entrance jambs utilizing stainless steel drive pins in the four corners of the plates.
- L. Fire Evacuation Signs: Provide applied fire evacuation signs incorporating a pictograph as depicted in 2.27.9 of the Elevator Code and mount above each hall button in the elevator lobbies.
- M. Elevator Identification Signs: Provide applied elevator identification signs with black raised number markings and a stainless background to identify the elevator on both jambs of the main and alternate fire recall floor hoistway entrances. Signs to be mounted directly below handicap jamb markings, vertically in line with handicap jamb markings, with ¼" to ½" inch space between signs.
- N. All stainless steel shall be provided with #4 brushed finish unless stated otherwise.

PART 3 EXECUTION

3.1 PREPARATIONS

- A. Site Inspection: Examine elevator areas, with installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of elevator work. Examine hoistway, hoistway openings, pit, and machine room as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF ELEVATOR SYSTEM

- A. General: Comply with manufacturer's instructions and recommendations for work required during installation, referenced codes, and specifications.
- B. Welded Construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- C. Coordination: Coordinate elevator work with other sections for proper time and sequence to avoid construction delays. The contractor shall provide fully operational elevator system as stipulated in the construction schedule.
- D. Sound Isolation: Mount rotating and vibrating elevator equipment and components on vibration absorption mounts, designed to effectively prevent transmission of vibrations to structure, and thereby eliminate sources of structure borne noise from elevator system.
- E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing. Set sills flush with finished floor surface at landings. Fill space under sills solidly with non-shrink, non-metallic grout.
- F. Guide Rails: The guide rails shall be adaptable to contractor's equipment, erected plumb, properly aligned, and anchored securely to the existing structure.

- G. Hoisting: All required hoisting and movement of the elevator equipment shall be the responsibility of the contractor in this section.
- H. Jack Unit Packing: Upon completion of the construction, and prior to final acceptance, the jack packing on each cylinder head shall be replaced with new.
- I. Final Cleaning & Painting: Upon completion of all elevator work, provide total clean down of elevator equipment. All steel components in machine room and hoistway shall be provided with touch up painting to remove all scratches and blemishes incurred during construction.

3.3 ELECTRIC WIRING

- A. Conductors: Copper throughout with individual wires coded and all connections on identified studs or terminal blocks. Use no splices or similar connections on any wiring except at terminal blocks, control cabinets, junction boxes or conduits. Provide 10% spare conductors throughout.
- B. Conduit: Painted or galvanized steel or aluminum conduit and duct shall be used. Conduit size shall be ½" minimum, except that ¾" can be used for runs containing only 2 wires. Flexible conduit exceeding 18" in length shall not be used. Flexible heavy-duty service cord, type SO, may be used between fixed car wiring and car door switches for safety edges.

3.4 FIELD QUALITY CONTROL

- A. Acceptance Testing: Upon nominal completion of the elevator installation, and before permitting use of elevator (either temporary or permanent), perform acceptance tests as depicted in Rule 8.10.3, "Acceptance Inspection and Tests of Passenger & Freight Hydraulic Elevators", of the Elevator Code. Also perform other tests, if any, as required by governing regulations.
 - 1. Contractor is responsible for coordinating observance of final acceptance inspection with the Owner's representative and a representative of ATIS Elevator Consulting, as they have been retained by the Owner to represent the State of Missouri as the Licensed Elevator Inspector. Contractor is also responsible for coordinating any additional inspectors as required by local jurisdiction.
- B. Diagnostic Testing: The diagnostic testing device, or maintenance terminal, provided shall be demonstrated and tested during the final testing of the elevator installation. This diagnostic tool shall have the capability of troubleshooting and field programmability of all control variables providing interaction between the service man and the microprocessor controller including performance of all ongoing safety testing as required by the Elevator Code.

3.5 INSTRUCTION AND MAINTENANCE

- A. A maximum period of four hours shall be dedicated to instruct Owner's personnel in proper use, operation and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.

3.6 PROTECTION

- A. Temporary Use: Comply with the following requirements for each elevator used for construction purposes.

1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
 2. Provide strippable protective film on entrance and car doors and frames.
 3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
 4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
 5. Engage elevator installer to provide full maintenance service for elevators used for construction purposes. Include preventative maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Use parts and supplies as used in the manufacture and installation of original equipment.
 6. Engage elevator installer to restore damaged work, if any, so that no evidence remains of corrective work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.
- B. At the time of substantial completion of elevator work (or portion thereof) provide suitable protective covering, barriers, devices, signs, or such other methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

3.7 ELEVATOR SCHEDULE

A. Furnish and Install	One (1) Holeless Hydraulic Passenger Elevator
B. Type of Machine	Hydraulic Power Drive Machine with Holeless Plunger / Cylinder Type Lift.
C. Load (Capacity)	3500 lbs.
D. Car Speed	100 Feet Per Minute
E. Drive	A.C. Motor Drive with Reduced Starting Current and Automatic Two Way Leveling
F. Operation	Simplex Operation with: Independent Service Fireman's Emergency Service Emergency Power Sequencing Emergency Communications Verification Hoistway Access
G. Approximate Travel	12'-0"
H. Stops/Openings	Two (2) at Floors ★LL, 1

I. Opening Size	3'-6" W by 7'-0" H
J. Type of Car & Hoistway Entrance	Side Opening, Single Speed
K. Door Operation	Automatic, Heavy Duty, Closed Loop.
L. Car Enclosure	As Specified.
M. Minimum Car Inside Dimensions	6'-8" wide by 5'-5" deep
N. Signal Fixtures	
1. Car Control Panel	Provide applied car control station panel with position indicator.
2. Hall Buttons	Provide riser of hall buttons. Provide hoistway access key switches in terminal landing buttons.
3. Emergency Fixture	Provide emergency fixture at Floor LL.
4. "In-Car" Hall Lantern	Provide "in-car" hall lantern in the jamb opposite the hall call buttons.
O. New Installation Maintenance	Twelve (12) Months

END OF SECTION 142400

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe sleeves.

1.02 RELATED REQUIREMENTS

- A. Section 22 05 53 - Identification for Plumbing Piping and Equipment: Piping identification.

1.03 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013a (Reapproved 2017).

1.04 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a 1 year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 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

3.01 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.

3.02 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 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.

3.03 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 220517

SECTION 221005 - PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Flanges, unions, and couplings.

1.02 REFERENCE STANDARDS

- A. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250 2021.
- B. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2022).
- C. AWWA C606 - Grooved and Shouldered Joints 2022.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

2.02 SANITARY SEWER PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized, using one of the following joint types:
 - 1. Threaded Joints: ASME B16.4 cast iron fittings.
 - 2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

2.03 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
 - 1. Ferrous pipe: Class 150 malleable iron threaded unions.
- B. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
 - 1. Dimensions and Testing: In accordance with AWWA C606.
 - 2. Housing Material: Provide ASTM A47/A47M malleable iron, ductile iron, or _____, galvanized.
 - 3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
 - 4. When pipe is field grooved, provide coupling manufacturer's grooving tools.

2.04 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.
- 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.

PART 3 EXECUTION

3.01 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.

3.02 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. Refer to Section 22 05 16.
- F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

3.03 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe Size: 1-1/2 inches to 2 inches:

- 1) Maximum Hanger Spacing: 10 ft.
- 2) Hanger Rod Diameter: 3/8 inch.

END OF SECTION 221005

SECTION 221429 - SUMP PUMPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submersible sump pumps.

1.02 REFERENCE STANDARDS

- A. ICC (IPC) - International Plumbing Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide certified pump chart or curve with duty point marked over.

1.04 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 1-year manufacturer warranty for pumps and related components. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 SUBMERSIBLE SUMP PUMPS

- A. Manufacturers:
 - 1. PROFLO: www.ferguson.com/#sle.
 - 2. Zoeller Company: www.zoeller.com/#sle.
 - 3. Stancor.
- B. General: Rugged stainless steel and cast iron housing and base with oil-filled motor chamber, ball bearings, and mechanical seal.
- C. Impeller: Thermoplastic; open nonclog, stainless steel shaft.
- D. Motor: Base mount, enclosed, lubricated oil-free, thermal-overload protected, continuous duty, permanent split capacitor with oil-resistant, three-prong connector, 10 foot power cord.
- E. Controls: Integral, chemically-resistant, vertical plated-steel rod float switch. Cycle pump Off/On between 2.5 and 9 inch heights from bottom of pump.
- F. Solids Handling Capacity: Pass lint and other small solids up to 1/2 inch in size.

- G. Discharge Pipe Size: 2 inch, NPT, female.
- H. Maximum Water-Based Effluent Temperature: 120 degrees F.
- I. Accessories: Provide full flow swing-type discharge check valve and oil smart switch & alarm panel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products with related fittings and accessories according to manufacturer instructions.
- B. Observe and provide incidentals required to complete installation in compliance with ICC (IPC).

END OF SECTION 221429

SECTION 223000 - PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A Sump pumps.

1.02 SUBMITTALS

- A Product Data:
 1. Indicate pump type, capacity, power requirements.

1.03 QUALITY ASSURANCE

PART 2 PRODUCTS

2.01 SUMP PUMPS

- A Manufacturers:
 1. Armstrong Fluid Technology: www.armstronfluidtechnology.com/#sle.
 2. Goulds Water Technology, a xylem brand: www.goulds.com/#sle.
 3. Zoeller Company: www.zoeller.com/#sle.
- B Type: Vertical centrifugal, direct connected, simplex arrangement.
- C Casing: Cast iron volute with radial clearance around impeller, inlet strainer, slide away couplings.
- D Impeller: Cast iron; open non-clog, keyed to corrosion resistant alloy steel shaft.
- E Support: Cast iron pedestal motor support on steel floor plate with gas tight gaskets.
- F Bearings: Forced grease lubricated bronze sleeve spaced maximum 48 inches (1200 mm) and grease lubricated ball thrust at floor plate.
- G Drive: Flexible coupling to vertical, solid shaft ball bearing electric motor.
- H Sump: Steel cover plate with steel curb frame for grouting into concrete sump with inspection opening and cover, and alarm fittings.

PART 3 EXECUTION

3.01 INSTALLATION

- A Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B Coordinate with plumbing piping and related electrical work to achieve operating system.

C Pumps:

1. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

END OF SECTION 223000

SECTION 230719 - HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.
- D. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2023.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.03 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

2.01 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.

2.02 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.

2.03 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

3.01 EXAMINATION

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

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 078400.

3.03 SCHEDULE

- A. Heating & Cooling Systems:
1. Supply & Return: 1"
 2. Interior Refrigerant Hot Gas & Suction: 3/4"
 3. Exterior Refrigerant Hot Gas & Suction: 2" with aluminum jacket.

END OF SECTION 230719

SECTION 238126.13 - SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS

PART 1 GENERAL

1.01 SECTION INCLUDES:

- A Air-source heat pumps.
- B Air-cooled condensing units.
- C Indoor air-handling (fan and coil) units for ductless systems.
- D Controls.

1.02 REFERENCE STANDARDS

- A AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment 2023.
- B AHRI 520 - Performance Rating of Positive Displacement Condensing Units 2004.
- C ASHRAE Std 23 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Compressor Units 2022.
- D NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- E NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems 2021.
- F UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A See Section 013000 – Administrative Requirements for submittal procedures.
- B Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C Project Record Documents: Record actual locations of components and connections.

PART 2 PRODUCTS

2.01 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 and Cooling: Air-source electric heat pump located in outdoor unit with evaporator.
2. 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.

2.02 INDOOR AIR HANDLING UNITS FOR DUCTLESS SYSTEMS

A Manufacturers:

1. Mitsubishi
2. Daikin
3. Trane Inc:

B Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, evaporator coil, and controls; wired for single power connection with control transformer.

C 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. Manufacturer: System manufacturer.

2.03 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.

PART 3 EXECUTION

3.01 EXAMINATION

SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS

T2211-01 CONSTRUCT NEW ELEVATOR & ASSEMBLY

MILITARY EDUCATION FACILITY IKE SKELTON TRAINING SITE

238126.13-2

- A Verify that proper power supply is available and in correct location.
- B Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- C Verify that proper fuel supply is available for connection.

3.02 INSTALLATION

- A Install in accordance with NFPA 90A and NFPA 90B.

END OF SECTION 238126.13

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A Single conductor building wire.
- B Metal-clad cable.
- C Wiring connectors.
- D Electrical tape.
- E Oxide inhibiting compound.
- F Wire pulling lubricant.

1.02 REFERENCE STANDARDS

- A ASTM B3 - Standard Specification for Soft or Annealed Copper Wire 2013 (Reapproved 2018).
- B ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011 (Reapproved 2017).
- C ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes 2010, with Editorial Revision (2020).
- D ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation 2004 (Reapproved 2020).
- E ASTM B800 - Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes - Annealed and Intermediate Temps 2005 (Reapproved 2021).
- F ASTM B801 - Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy for Subsequent Covering or Insulation 2018.
- G ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape 2017.
- H NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- I NECA 104 - Standard for Installing Aluminum Building Wire and Cable 2012.
- J NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable 2018.
- K NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2021.
- L NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- M UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.
- N UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.
- O UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.
- P UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.
- Q UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.
- R UL 1569 - Metal-Clad Cables Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A Coordination:

1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.

1.05 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C Nonmetallic-sheathed cable is not permitted.
- D 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 (1.8 m).

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A Provide products that comply with requirements of NFPA 70.
- B Provide products listed, classified, and labeled as suitable for the purpose intended.
- C 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 except where aluminum conductors are specifically indicated. Substitution of aluminum conductors for copper is not permitted. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
 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.
 4. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.
- 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: White.
 - b. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A Manufacturers:

1. Copper Building Wire:
 - a. Cerro Wire LLC: www.cerrowire.com/#sle.
 - b. Encore Wire Corporation: www.encorewire.com/#sle.
 - c. General Cable Technologies Corporation: www.generalcable.com/#sle.
 - d. Southwire Company: www.southwire.com/#sle.

B Description: Single conductor insulated wire.

C Conductor Stranding:

1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.

D Insulation Voltage Rating: 600 V.

E Insulation:

1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
 - a. Installed Underground: Type XHHW-2.

2.04 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.

2.05 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.

2.06 ACCESSORIES

A Electrical Tape:

1. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).

B Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.

C Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

PART 3 EXECUTION

3.01 EXAMINATION

- A Verify that interior of building has been protected from weather.
- B Verify that work likely to damage wire and cable has been completed.
- C Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D Verify that field measurements are as indicated.
- E Verify that conditions are satisfactory for installation prior to starting work.

3.02 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. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is permitted, under the following conditions:
 - a. Increase size of conductors as required to account for ampacity derating.
 - b. Size raceways, boxes, etc. to accommodate conductors.
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 aluminum conductors in accordance with NECA 104.
- E Install metal-clad cable (Type MC) in accordance with NECA 120.
- F 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.
- G Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- H 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.
- I 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.
- J Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.
- K Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- L Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- M 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 contaminates. Do not use wire brush on plated connector surfaces.
 - 5. Connections for Aluminum Conductors: Fill connectors with oxide inhibiting compound where not pre-filled by manufacturer.
- N 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.

- O Insulate ends of spare conductors using vinyl insulating electrical tape.
- P Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- Q Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A Grounding and bonding requirements.
- B Conductors for grounding and bonding.
- C Connectors for grounding and bonding.

1.02 RELATED REQUIREMENTS

- A Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- C Section 265600 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

1.03 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.

1.04 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 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 Grounding Electrode System:

1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
2. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal domestic water service pipe(s) that are in direct contact with earth for at least 10 feet (3.0 m) at an accessible location not more than 5 feet (1.5 m) from the point of entrance to the building.
 - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
 - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
3. Concrete-Encased Electrode:
 - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet (6.0 m) of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.

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.
7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
 - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
8. Provide bonding for interior metal air ducts.

2.02 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 260526:
 - 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- 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 exothermic welded connections for underground, concealed and other inaccessible connections.
 - 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

PART 3 EXECUTION

3.01 EXAMINATION

- A Verify that work likely to damage grounding and bonding system components has been completed.
- B Verify that field measurements are as indicated.
- C Verify that conditions are satisfactory for installation prior to starting work.

3.02 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. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.

4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

D Identify grounding and bonding system components in accordance with Section 260553.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.

1.02 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 2019.
- 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.
- G NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 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.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.04 QUALITY ASSURANCE

- A Comply with NFPA 70.
- B Comply with applicable building code.

PART 2 PRODUCTS

2.01 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. 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.
- E Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
 - 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch (13 mm) diameter.
 - b. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch (6 mm) diameter.
 - c. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch (10 mm) diameter.
- F Anchors and Fasteners:

1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.01 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.

3.02 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.

END OF SECTION 260529

SECTION 260533.13 - CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A Galvanized steel rigid metal conduit (RMC).
- B Electrical metallic tubing (EMT).
- C Rigid polyvinyl chloride (PVC) conduit.
- D Conduit fittings.

1.02 RELATED REQUIREMENTS

- A Section 078400 - Firestopping.
- B Section 260526 - Grounding and Bonding for Electrical Systems.
- C Section 260529 - Hangers and Supports for Electrical Systems.
- D Section 260533.16 - Boxes for Electrical Systems.
- E Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- F Section 262100 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.

1.03 REFERENCE STANDARDS

- A ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.
- B ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.
- C NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2020.
- E NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) 2017.
- F NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- G NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.
- H NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2021.

- I NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- K UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- L UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.
- M UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A Coordination:

1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B Sequencing:

1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C Underground:
 1. Under Slab on Grade: Use rigid PVC conduit.

- D Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- E Exposed, Interior, Not Subject to Physical Damage: Use 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.
- 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.

2.02 CONDUIT REQUIREMENTS

- A Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- B Provide products listed, classified, and labeled as suitable for the purpose intended.
- C Minimum Conduit Size, Unless Otherwise Indicated:
- D Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B Fittings:
 - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 ELECTRICAL METALLIC TUBING (EMT)

- A Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

3. Connectors and Couplings: Use set-screw type.
 - a. Do not use indenter type connectors and couplings.

2.05 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- B Fittings:
 1. Manufacturer: Same as manufacturer of conduit to be connected.
 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

PART 3 EXECUTION

3.01 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.

3.02 INSTALLATION

- A Install products in accordance with manufacturer's instructions.
- B Perform work in accordance with NECA 1 (general workmanship).
- C Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- E Conduit Routing:
 1. When conduit destination is indicated without specific routing, determine exact routing required.
 2. Conceal all conduits unless specifically indicated to be exposed.
 3. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 - c. Within joists in areas with no ceiling.
 4. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or

perpendicular to building structure and surfaces, following surface contours where practical.

5. Arrange conduit to maintain adequate headroom, clearances, and access.

F Conduit Support:

1. Secure and support conduits in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

G 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.

H Penetrations:

1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

I Underground Installation:

1. Minimum Cover, Unless Otherwise Indicated or Required:

- a. Underground, Exterior: 36" .
- 2. Provide underground warning tape in accordance with Section 260553 along entire conduit length for service entrance where not concrete-encased.
- J Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment.
 - 1. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
- K 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.
- L Provide grounding and bonding in accordance with Section 260526.

END OF SECTION 260533.13

SECTION 260533.16 - BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 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.

1.02 RELATED REQUIREMENTS

- A Section 083100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- B Section 260526 - Grounding and Bonding for Electrical Systems.
- C Section 260529 - Hangers and Supports for Electrical Systems.
- D Section 260533.13 - Conduit for Electrical Systems:
 - 1. Conduit bodies and other fittings.
- E Section 262726 - Wiring Devices:
 - 1. Wall plates.

1.03 REFERENCE STANDARDS

- A NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- 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 2020.
- E NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- 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 Current Edition, Including All Revisions.

1.04 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.

1.05 DELIVERY, STORAGE, AND HANDLING

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

1.06 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 BOXES

A General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled as suitable for the purpose intended.
4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

- B Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 3. Use suitable concrete type boxes where flush-mounted in concrete.
 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 6. Use shallow boxes where required by the type of wall construction.
 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Wall Plates: Comply with Section 262726.
- C Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 - a. Indoor Clean, Dry Locations: Type 1, painted steel.
 3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
 - a. Provide screw-cover enclosures unless otherwise indicated.

PART 3 EXECUTION

3.01 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.

3.02 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 Box Locations:
 - 1. Locate boxes to be accessible. Provide access panels in accordance with Section 083100 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.
 - 4. Locate boxes so that wall plates do not span different building finishes.
 - 5. Locate boxes so that wall plates do not cross masonry joints.
- E Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
- F Install boxes plumb and level.
- G Flush-Mounted Boxes:
 - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.
 - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.
- H Install boxes as required to preserve insulation integrity.
- I Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- J Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- K Close unused box openings.
- L Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

M Provide grounding and bonding in accordance with Section 260526.

3.03 CLEANING

A Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

END OF SECTION 260533.16

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A Electrical identification requirements.
- B Identification nameplates and labels.
- C Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.03 REFERENCE STANDARDS

- A ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs 2011 (Reaffirmed 2017).
- B ANSI Z535.4 - American National Standard for Product Safety Signs and Labels 2011 (Reaffirmed 2017).
- C NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D NFPA 70E - Standard for Electrical Safety in the Workplace 2021.
- E UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A Coordination:
 - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B Sequencing:
 - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
 - 2. Do not install identification products until final surface finishes and painting are complete.

1.05 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.

1.06 FIELD CONDITIONS

- A Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 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 ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces.
 - 5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
2. 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.
3. 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 (89 mm by 127 mm).
 - 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 260519.
2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A Identification Nameplates:

1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
3. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) 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.

2.03 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 (178 by 254 mm) 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 (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 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. Branch Devices: Adjacent to device.
 6. Interior Components: Legible from the point of access.
 7. Conductors and Cables: Legible from the point of access.
- 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.

END OF SECTION 260553

SECTION 260583 - WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
 - 2. Determine connection locations and requirements.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION 260583

SECTION 262726 - WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A Wall Switches.
- B Receptacles.
- C Wall plates.

1.02 RELATED REQUIREMENTS

- A. Section 260533.16 - Boxes for Electrical Systems.
- B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 260923 - Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors, in-wall time switches, and in-wall interval timers.

1.03 REFERENCE STANDARDS

- A FS W-C-596 - Connector, Electrical, Power, General Specification for 2014h, with Amendments (2017).
- B NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- D NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).
- E NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.
- F NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G UL 498 - Attachment Plugs and Receptacles Current Edition, Including All Revisions.
- H UL 514D - Cover Plates for Flush-Mounted Wiring Devices Current Edition, Including All Revisions.
- I UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.

2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A See Section 013000 – Administrative Requirements for Submittal requirements.
- B Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- C Project Record Documents: Record actual installed locations of wiring devices.

1.06 QUALITY ASSURANCE

- A Comply with requirements of NFPA 70.
- B Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B Provide GFCI protection for receptacles installed within 6 feet (1.8 m) of sinks.

2.02 WIRING DEVICE FINISHES

- A Provide wiring device finishes as described below unless otherwise indicated.
- B Wiring Devices Installed in Finished Spaces: White with white nylon wall plate.

2.03 RECEPTACLES

- A Manufacturers:
 1. Hubbell Incorporated: www.hubbell.com/#sle.
 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.

WIRING DEVICES

3. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 4. 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 with separate ground terminal screw.
 2. NEMA configurations specified are according to NEMA WD 6.
- C Convenience Receptacles:
- 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. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
 - a. Products:
 - 1) Hubbell Incorporated: www.hubbell-wiring.com/#sle.
 - 2) Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 3) Lutron Electronics Company, Inc: www.lutron.com/#sle.
 - 4) Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.

2.04 WALL PLATES

- A Manufacturers:
1. Hubbell Incorporated: www.hubbell-wiring.com/#sle.
 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 3. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
- B Wall Plates: Comply with UL 514D.
1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 2. Size: Standard.
 3. Screws: Metal with slotted heads finished to match wall plate finish.
- C Nylon Wall Plates: Smooth finish, high-impact thermoplastic.

PART 3 EXECUTION

3.01 EXAMINATION

WIRING DEVICES

- A Verify that field measurements are as indicated.
- B Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D Verify that final surface finishes are complete, including painting.
- E Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
- C Install wiring devices in accordance with manufacturer's instructions.
- D Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.
- F Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H 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.

3.03 ADJUSTING

- A Adjust devices and wall plates to be flush and level.
- B Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

3.04 CLEANING

- A Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION 262726

SECTION 265100 - INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A Interior luminaires.

1.02 RELATED REQUIREMENTS

- A Section 260529 - Hangers and Supports for Electrical Systems.
- B Section 260533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products 2019.
- B IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources 2021.
- 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 1999 (Reaffirmed 2006).
- F NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G UL 1598 - Luminaires Current Edition, Including All Revisions.
- H UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products Current Edition, Including All Revisions.

1.04 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. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 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, 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.
 - b. Include IES LM-79 test report upon request.

1.06 QUALITY ASSURANCE

- ### **A Comply with requirements of NFPA 70.**

1.07 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.**

1.08 FIELD CONDITIONS

- ### **A Maintain field conditions within manufacturer's required service conditions during and after installation.**

1.09 WARRANTY

- ### **A Provide five year manufacturer warranty for LED luminaires, including drivers.**

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- ### **A Furnish products as indicated in luminaire schedule included on the drawings.**
- ### **B Substitutions: See Section 016000 - Product Requirements except where individual luminaire types are designated with substitutions not permitted.**

2.02 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. Lutron Electronics Company, Inc; www.lutron.com/#sle.
 5. 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.

2.03 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

4.01 EXAMINATION

- A Verify that field measurements are as indicated.
- B Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate 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.

4.02 PREPARATION

- A Provide extension rings to bring outlet boxes flush with finished surface.
- B Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

4.03 INSTALLATION

- A Coordinate locations of outlet boxes provided under Section 260533.16 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 260529.
- 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 Install accessories furnished with each luminaire.

I Bond products and metal accessories to branch circuit equipment grounding conductor.

J Install lamps in each luminaire.

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.

4.04 FIELD QUALITY CONTROL

A See Section 01 40 00 - Quality Requirements, for additional requirements.

B Inspect each product for damage and defects.

C Operate each luminaire after installation and connection to verify proper operation.

D Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.

E Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

4.05 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.

4.06 CLEANING

INTERIOR LIGHTING

T2211-01 DESIGN & CONSTRUCT ELEVATOR & ASSEMBLY

MILITARY EDUCATION FACILITY IKE SKELTON TRAINING SITE

265100-5

- 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 265100

SECTION 284600 - FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 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.

1.02 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.
- B. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 72 - National Fire Alarm and Signaling Code Most Recent Edition Cited by Referring Code or Reference Standard.
- E. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

- A. 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.
- B. 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.
- C. Operating and Maintenance Data: See Section 01 78 00 for additional requirements; revise and resubmit until acceptable; have one set available during closeout demonstration:
1. Complete set of specified design documents, as approved by authority having jurisdiction.
 2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
 3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
 4. List of recommended spare parts, tools, and instruments for testing.
 5. Replacement parts list with current prices, and source of supply.
 6. Detailed troubleshooting guide and large scale input/output matrix.
 7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
 8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.
- D. Project Record Documents: See Section 01 78 00 for additional requirements; have one set available during closeout demonstration:
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.
- E. 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.

1.04 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.

1.05 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

2.01 FIRE ALARM SYSTEM

- A. Fire Alarm System: Provide modifications and extensions to the existing automatic fire detection and alarm system:
 - 1. Provide all components necessary, regardless of whether shown in Contract Documents or not.
 - 2. 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.

- 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.

2.02 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. Initiating Devices:
 - 1. Smoke Detectors: .

PART 3 EXECUTION

3.01 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.

3.02 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.

3.03 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.

3.04 MAINTENANCE

- A. See Section 01 70 00 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Provide to Owner, at no extra cost, a written maintenance contract for entire manufacturer's warranty period, to include the work described below.
- C. 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.
- D. 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.
- E. Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.
- F. 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.
- G. Comply with Owner's requirements for access to facility and security.

END OF SECTION 284600

SECTION 312300 - EXCAVATION AND FILL

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Perform Project excavating, trenching, backfilling, and compacting as described in Contract Documents, except as specified below.
 - 2. Procedure and quality for excavating, trenching, backfilling, and compacting performed on Project under other Sections unless specifically specified otherwise.
- B. Related Sections
 - 1. Section 02 05 00 - General Site Construction Requirements
 - 2. Section 31 22 19 – Finish Grading

1.2 REFERENCES

- A. American Society For Testing And Materials
 - 1. ASTM D 1557-00, 'Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort'
 - 2. ASTM D 2216-98, 'Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock'
 - 3. ASTM D 2487-00, 'Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)'
 - 4. ASTM D 2922-96, 'Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)'
 - 5. ASTM D 3017-96, 'Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)'

1.3 DEFINITIONS

- A. Relative Compaction - Ratio of field dry density as determined by ASTM D 2922 and ASTM D 3017 or 2216, and laboratory maximum dry density as determined by ASTM D 1557.

1.4 QUALITY ASSURANCE

- A. Pre-Installation Conference - Participate in pre-installation conference specified in Section 02 31 10.

1.5 SEQUENCING

- A. Do not backfill against bituminous dampproofing for 24 hours after application of dampproofing.

- B. Before backfilling, show utility and service lines being covered on record set of Drawings. Do not backfill until utilities involved have been tested and approved by Engineer and until instructed by Engineer.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Site Material - Existing excavated material on site is suitable for use as fill and backfill to meet Project requirements.
- B. Imported Fill / Backfill
 - 1. Well graded material conforming to ASTM D 2487 free from debris, organic material, frozen materials, brick, lime, concrete, and other material which would prevent adequate performance of backfill.
 - a. Under Building Footprint And Paved Areas - Fill shall comply with soil classification groups GW, GP, GM, SW, SP, or SM. Fill may not contain stones over 6 inches diameter and 90 percent minimum of fill shall be smaller than 1-1/2 inch in any direction.
 - b. Under Landscaped Areas -
 - 1) Fill more than 36 inches below finish grade shall comply with soil classification groups GW, GP, GM, SW, SP, or SM. Fill may not contain stones over 6 inches diameter and 90 percent minimum of fill shall be smaller than 1-1/2 inch in any direction.
 - 2) Fill less than 36 inches below finish grade shall comply with soil classification groups SW, SP, SM, or SC. Fill may not contain stones larger than 1-1/2 inches in any direction and 90 percent minimum of fill shall be smaller than 3/8 inch in any direction.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Carefully examine site and available information to determine type soil to be encountered. Discuss problems with Engineer before proceeding with work.

3.2 PREPARATION

- A. Protection of Existing Utilities
 - 1. Protect existing utilities identified in Contract Documents during excavation.
 - 2. If existing utility lines not identified in Contract Documents are encountered, contact Engineer before proceeding.
- B. Before placing fill, base, or finish work, prepare sub-grade as follows
 - 1. Under Building Slabs / Pads, Concrete Site Elements, And Portland Cement Concrete Parking Areas - Scarify sub-grade 6 inches deep, moisture condition to uniform moisture

content of between optimum and 4 percent over optimum, and mechanically tamp 6 inches deep to 90 percent minimum of relative compaction.

2. Landscape Areas - Compact sub-grade to 85 percent relative compaction.

3.3 PERFORMANCE

A. Excavation

1. Building Footings And Foundations -
 - a. Excavate as necessary for proper placement and forming of footings and foundations.
 - b. Bottom of excavations to receive footings shall be undisturbed soil.
 - c. Excavation Carried Deeper Than Required -
 - 1) Under Footings - Fill with concrete specified for footings.
 - 2) Under Slabs - Use specified compacted backfill material.
2. Pavement And Concrete Site Elements -
 - a. Excavate as necessary for proper placement and forming of concrete site elements and pavement structure. Remove vegetation and deleterious material and remove from site.
 - b. Backfill over-excavated areas with compacted base material specified in Sections under 02 70 00 heading.
 - c. Remove and replace exposed material which becomes soft or unstable.
3. Utility Trenches -
 - a. Unless otherwise indicated, excavation shall be open cut. Short sections of trench may be tunneled if pipe or duct can be safely and properly installed and backfill can be properly tamped in tunnel sections and if approved by Engineer.
 - b. Excavate to proper alignment, depth, and grade. Excavate to sufficient width to allow adequate space for proper installation and inspection of utility piping.
 - c. If trenches are excavated deeper than required, backfill until trench bottom is proper depth with properly compacted native material.
 - d. Pipe 4 Inches In Diameter Or Larger -
 - 1) Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil at every point along its length.
 - 2) Except where rock is encountered, take care not to excavate below depths indicated.
 - a) Where rock excavations are required, excavate rock with minimum over-depth of 4 inches below required trench depths.
 - b) Backfill over-depths in rock excavation and unauthorized over-depths with loose, granular, moist earth, thoroughly compacted.
 - 3) Whenever wet or unstable soil incapable of properly supporting pipe, as determined by Engineer, occurs in bottom of trench, remove soil to depth required and backfill trench to proper grade with coarse sand, fine gravel, or other suitable material acceptable to Engineer.
4. If unusual excavating conditions are encountered, stop work and notify Engineer.

B. Fill / Backfill

1. General -
 - a. Around Buildings And Structures - Slope grade away from building as specified in Section 02 31 20. Hand backfill when close to building or where damage to building might result.
 - b. Site Utilities -
 - 1) In Landscape Areas - Use backfill consisting of on-site soil.
 - 2) Under Pavement And Concrete Site Elements - Extend excavatable slurry fill / backfill to elevation of subgrade. Do not place base material until excavatable slurry fill / backfill has cured 72 hours.
 - c. Do not use puddling or jetting to consolidate fill areas.
2. Compacting -
 - a. Fill / Backfill And Base -
 - 1) Under Building Slabs or Pads, Driveways, And Parking Areas - Place in 8 inch maximum layers, dampen (do not soak), and mechanically tamp to 95 percent minimum of maximum density as established by ASTM D 1557.
 - 2) Under Concrete Site Elements And Around Foundation Walls - Place in 8 inch maximum layers, dampen (do not soak), and mechanically tamp to 90 percent minimum of maximum density as established by ASTM D 1557.
 - 3) Utility Trenches -
 - a) Site - Place fill in 12 inch layers and moisture condition to plus or minus 2 percent of optimum moisture content. Compact fill to 90 percent minimum relative compaction to within 12 inches of finish grade. Compact fill above 12 inches to 85 percent relative compaction
 - b) Under Slabs - Place fill in 6 inch layers, moisture condition to plus or minus 2 percent of optimum moisture content, and compact to 95 percent minimum relative compaction to within 4 inches of finish grade. Final 4 inches of fill shall be granular base.
 - 4) Fill Slopes - Compact by rolling or using sheepsfoot roller.
 - 5) Backfill Under Footings - Not allowed.
 - 6) Other Backfills - Place other fills in 12 inch layers and compact to 90 percent relative compaction.
 3. Quality Assurance – Owner will engage independent testing agency for all compaction verification.

3.4 REPAIR / RESTORATION

- A. Repair damage to other portions of the Work resulting from work of this Section at no additional cost to Owner. On new work, arrange for damage to be repaired by original installer.

3.5 CLEANING

- A. Debris and material not necessary for Project are property of Contractor and are to be removed before completion of Project. However, if material necessary for Project is hauled away, replace with specified fill / backfill material.

END OF SECTION 312300

SECTION 312313 - SUBGRADE PREPARATION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. This work shall consist of preparing the subgrade upon which the base course is to be constructed. The work includes, but is not limited to excavating, removal, clearing and grubbing, backfilling, filling, compacting and scarifying required to properly prepare and adjust the paved areas to the proper elevations and conditions as specified in the Plans and Specifications.

1.2 QUALITY ASSURANCE:

- A. APPLICABLE STANDARD: MODOT Section 209

1.3 JOB CONDITIONS:

- A. EXISTING CONDITIONS: Any area which is located under proposed pavement or gravel driveway/parking area where the existing ground elevation is below the bottom elevation of the proposed base course will require stripping of topsoil before filling. Fill required under a sidewalk, patio, parking spaces or driveway shall be engineered soil or granular material. All areas will require excavation of any earth with organic material, roots or other materials and be brought to subgrade elevation prior to placing base material.

PART 2 - PRODUCTS

2.1 SUBGRADE

- A. That portion of the graded earth upon which the surfacing is to be placed is hereby designated as the subgrade. The subgrade shall be constructed so that it will be uniform in density throughout its entire width and will conform to the line, grade, and cross section shown on the Plans.

2.2 EQUIPMENT

- A. A self-propelled steel wheel sheeps foot roller weighing not less than 10 tons shall be used in preparing the subgrade. Smaller compaction equipment may be used as needed to enter into more confined areas.

PART 3 - EXECUTION

3.1 SCARIFYING AND COMPACTION

- A. Scarifying and cultivating will be required for dry soils which are impervious to the penetration of water, for wet soils which contain excessive amounts of moisture which may result in unstable foundations, or for soils which are non-uniform in character which may

result in non-uniform relative compactions and subsequent differential settlements of the finished surfaces.

- B. After the rough grading, when it has been determined that scarifying and cultivating will be required, the earth shall be loosened to a depth of 6 inches and the loosened material shall be worked to a finely divided condition. All rocks larger than 3 inches shall be removed from the surface at this time. The moisture content shall then be brought to an optimum value for compaction, as determined by the Engineer, by the addition and blending of either a suitable dry material or water. The subgrade shall then be compacted by approved equipment to the Engineer's satisfaction.

3.2 UNSUITABLE SUBGRADE

- A. If, in the opinion of the Owner's representative, the subgrade is unsuitable for use, the Contractor shall remove the material to a depth of twelve (12) inches below the subgrade. Further, the Contractor shall replace this material with crushed rock in the 1 to 3 inch size which shall be rolled in with a sheeps foot roller.
- B. All soft and yielding spots shall be removed to a depth as specified by the Owner's representative, so that all vegetation or otherwise unsuitable material shall be removed, and the resulting spaces shall be refilled with approved material. All large rocks or boulders encountered shall be removed or broken off to a depth of not less than six inches below the finished surface of the subgrade, and the space shall be refilled. The subgrade shall again be rolled until no depressions occur.

3.3 FINISHING

- A. After excavation and embankment has been completed the subgrade shall be brought to true shape and rolled with a self-propelled drum roller weighing not less than ten tons. It shall then be tested with an approved template furnished by the Contractor. If the subgrade is not to proper elevation, base rock material shall be added or removed as required and if material is added it shall be compacted in a manner satisfactory to the Owner's Representative. This process shall be repeated until all irregularities are removed. Extreme care shall be taken in shaping the subgrade, so that at no place will the completed pavement vary from the specified thickness.

3.4 RESTORING SUBGRADE

- A. If the subgrade is disturbed in any manner after the work described under Section 3.2 and 3.3 above has been completed, it shall be brought to an acceptable condition by reshaping and rolling.

3.5 AMOUNT OF FINISHED SUBGRADE

- A. There shall be at all times at least 50 feet of finished subgrade ahead of the point at which the concrete is placed to the final section.

END OF SECTION 312313

SECTION 312500 EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide and maintain methods, equipment, and temporary construction as required to control conditions at the Site and adjacent areas.
2. Contractor shall maintain all controls until Contractor warranty period is complete, or until controls are no longer needed, whichever is earlier. Owner to take over maintenance of erosion and sediment controls following final completion of Contractor's work until site is stabilized.
3. Upon completion of the Work, remove temporary controls and restore Site to specified condition; if condition is not specified, restore Site to pre-construction condition.
4. Contractor shall provide all labor, materials, equipment and services required to provide all permanent erosion control measures as required.

1.2 QUALITY ASSURANCE

A. Comply with applicable provision and recommendations of the following:

1. Additional guidance can be found in "Protecting Water Quality: A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri and Kansas" (Revised January 2011).
2. Missouri Department of Transportation (MODOT) Standard Specifications, current edition.

1.3 SUBMITTALS

A. Product Data, Manufacturer Installation and Maintenance Instructions:

1. Submit manufacturer product data, installation instructions and maintenance instructions for all erosion control products included in this specification.

1.4 STORMWATER RUNOFF

A. Stormwater Control – General:

1. Provide methods to control stormwater runoff (surface drainage) and water from excavations and structures to prevent damage to the Work, the Site, and adjoining properties.
2. Control fill, grading, and ditching to direct water away from excavations, pits, tunnels and other construction areas and to direct drainage to proper runoff courses to prevent erosion, damage, or nuisance.

B. Equipment and Facilities for Stormwater Control: Provide, operate, and maintain equipment and facilities of adequate size to control storm water runoff.

C. The Contractor shall at all times during construction provide and maintain ample means and devices with which to remove promptly and dispose of properly all stormwater runoff entering the excavations or other parts of the Work and shall keep said excavations dry until the

structures to be built or pipelines to be placed therein are completed. No stormwater shall be allowed to rise over or come in contact with masonry until the concrete and mortar have attained a satisfactory set, except in cases where the concrete has been tremied into place with the approval of the Engineer. In water bearing sand, well points and/or sheeting shall be supplied, together with pumps and other appurtenances of ample capacity to keep the excavation free of stormwater.

- D. Discharge and Disposal: Dispose of stormwater in manner to prevent flooding, erosion, and other damage to any and all parts of the Site and adjoining areas, and that conforms to Laws and Regulations.
 - 1. Water used for working or processing, resulting from dewatering operations, or containing oils or sediments that will reduce the quality of the water downstream of the point of discharge, shall not be directly discharged. Such waters shall be diverted through a settling basin, filter or other approved method, before being discharged.
 - 2. Contractor will be held responsible for the condition of any pipe, conduit or channel used for drainage purposes and all such pipes, conduits or channels shall be left clean and free of sediment.

1.5 EROSION CONTROL

A. Erosion Control – General:

- 1. Plan and execute construction and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
- 2. Hold to a minimum the areas of bare soil exposed at one time.
- 3. Provide temporary control measures such as berms, dikes, and drains.
- 4. Construct fills and waste areas by selective placement to reduce surface silts or clays that will erode.
- 5. Periodically inspect earthwork to detect evidence of the start of erosion; apply corrective measures as required to control erosion. Continue inspections and corrective measures until permanent vegetation has been established.
- 6. The Contractor shall maintain drainage flow at all times through any ditches disturbed during construction. The Contractor shall minimize disturbance and sedimentation due to excavation in ditches and shall restore the ditches to their original condition and performance.
- 7. Periodically inspect impacted ditches and streams to detect evidence of the start of erosion; apply corrective measures as required to control erosion. Continue inspections and corrective measures until permanent erosion control and vegetation have been established.

B. Erosion Control:

- 1. Contractor may find additional guidance in “Protecting Water Quality: A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri and Kansas” (Revised January 2011).
- 2. Contractor shall submit proof of approved erosion control plans for excavated materials disposal site.
- 3. Contractor shall install and maintain erosion control around stockpiles of granular material using gravel filled bags or engineer approved equal.

4. Contractor shall install and maintain erosion control downstream from construction activity.
5. Contractor shall furnish, install, and maintain erosion control measures such as silt fences and temporary seeding and/or sodding on all disturbed areas.
6. Contractor to minimize granular deposits on the street surfaces and sidewalks, open to traffic. Excess material shall be removed at end of workday by approved methods. (i.e. street sweeper, brooming). Contractor shall not remove material by flushing street with water.
7. Contractor shall provide a trained individual to oversee the installation and maintenance of erosion and sedimentation control.
8. Contractor to inspect, repair, and maintain erosion and sedimentation control a minimum of once each week or by the end of the next business day after a storm event.
9. Corrective actions required, as a result of an inspection or control measure failure shall be scheduled within 24 hours of inspection or failure.
10. Contractor shall make the Construction Drawings and inspection reports available upon request.
11. Areas to be left inactive for 14 days or more to be treated with temporary or permanent seeding or sodding.
12. If provisions of these specifications conflict with provisions of the Standard Specifications the provisions of this specification will govern.

1.6 MAINTENANCE

- A. Contractor shall maintain erosion controls during Contractor warranty period. Including inspections after rain events, and restoration to original design condition as required.

PART 2 PRODUCTS

2.1 GENERAL-EROSION AND CONTROL

- A. All erosion and sediment control products shall be in accordance with the Missouri Department of Transportation Standards Specifications (MODOTSS).
- B. Engineer may approve equal products that meet the same intention as specified products.

2.2 SITE PREPARATION

- A. Temporary Construction Entrance
 1. Construction of temporary construction entrances shall conform to the details provided in the Contract Documents.
 2. Manufactures: The following geosynthetic material will be accepted:
 - a. Mirafi HP270
 - b. Or equal
 3. A woven geotextile fabric shall be installed for separation of subbase and base aggregate materials. Geotextile fabrics for use in construction entrances shall conform to the following table:

Woven Geotextile Fabric Requirements				
Construction Entrance Installation				
Physical Properties	Test Method	Unit	Minimum Value	
			MD	CD
Tensile Strength (at ultimate)	ASTM D4595	lbs/ft	2640	2460
Tensile Strength (at 2% strain)			480	588
Tensile Strength (at 5% strain)			1212	1356
Tensile Strength (at 10% strain)			2340	2412
Factory Sewn Seam	ASTM D4884	lbs/ft	1250	
Flow Rate	ASTM D4491	gal/min/ft ²	50	
Permeability		cm/sec	0.04	
Permittivity		sec ⁻¹	0.70	
Apparent Opening Size (AOS)	ASTM D4751	U.S. Sieve	30	
UV Resistance (at 500hrs)	ASTM D4355	% strength retained	80	

4. Base aggregate material shall consist of 2” aggregate and capped with 1” aggregate. Thickness of each aggregate layer shall conform to the dimensions indicated on the Drawings.
5. Prior to installation, all vegetation shall be removed from foundation area.
6. Foundation area shall be graded for positive drainage.
7. Where possible, divert all stormwater runoff and drainage from the temporary construction entrance to a sediment trap or basin.

B. Temporary Perimeter Protection - Silt Fence

1. Construction of sediment barriers shall conform to the details provided in the Contract Documents.
2. Sediment barriers shall be designed and used in situations in which only sheet or overland flows are expected.
3. Geotextile fabrics for use in sediment barriers shall conform to the following table:

Woven Geotextile Fabric Requirements			
Sediment Barrier Installation			
Physical Property	Test Method	Unit	Min. Value
Grab Tensile Strength	ASTM D 4632	lbs.	95-125
Grab Tensile Elongation	ASTM D 4632	%	15
Puncture Strength	ASTM D 4833	lbs.	60
Apparent Opening Size (AOS)	ASTM D 4751	U.S. Sieve	#30
Permittivity	ASTM D 4491	sec ⁻¹	0.1
Flow Rate	ASTM D 4491	gal/min/ft ²	10

4. Sediment barriers shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.

5. Sediment barriers shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.
6. Should the sediment barrier decompose or become ineffective prior to the upslope area being permanently stabilized, the barrier shall be replaced promptly.
7. Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-half the height of the barrier.
8. Any sediment deposits remaining, in place, after the barrier has been removed shall be dressed to conform to the existing grade, prepared, and seeded.

2.3 CONCRETE WASHOUT AREA

A. General

1. A concrete washout location shall be designated and a system shall be implemented to reduce the discharge of pollutants associated with concrete washout waste.
2. Construction/Installation of a concrete washout system shall be complete prior to concrete delivery.
3. Do not wash out concrete trucks or equipment into storm drains, wetlands, streams, rivers, creeks, ditches, or streets.
4. Signage shall be installed to designate location of concrete washout system.
5. Concrete washout system shall conform to the details on the Drawings.
6. Washout system shall utilize a pit or bermed area designed and maintained at a capacity to contain all liquid and concrete waste generated by washout operations, between scheduled cleanout periods.
7. Pit shall be lined with ten millimeter polyethylene lining to control seepage.
8. Place flags, safety fencing, or equivalent to provide a barrier to construction equipment and other traffic.
9. Inspect the overall washout system daily for leaks, spills, tracking of soil by equipment, lining failure, and hardened concrete.
10. Once concrete wastes have hardened, remove and dispose off-site.
11. Excess concrete shall be removed when the washout system reaches 50 percent of the design capacity.
12. Replace the plastic liner after each cleaning of the concrete washout system.
13. Concrete washout systems shall be cleaned, removed, filled, graded, and stabilized at the completion of concrete operations.
14. Pre-fabricated concrete washout systems may be used in lieu of a constructed pit. These include the "pop up" bags and designated roll-off bins.

2.4 EROSION CONTROL BLANKETS

A. Short-term (less than 6 month functional longevity) Erosion Control Blankets.

1. The blanket shall be 100% straw fiber matrix.
2. Stitching shall be photodegradable thread.
3. The blanket shall be double-net construction.

4. Contractor shall prepare soil according to the grading, seeding, fertilization and restoration requirements of the contract documents, prior installing erosion control blankets.
5. Installation of erosion control blankets shall conform to the details provided in the Contract Documents.
6. Anchoring shall be by means of 6” to 12” staples or pins and installed per manufacturers recommendations for specific application.
7. The blanket shall conform to the minimum requirements listed in the following table:

Erosion Control Blanket Requirements		
Short-Term Installation (Less than 6 Months Functional Longevity)		
Physical Property	Unit	Min. Value
Top Net Weight	lbs/1,000 ft ²	1.5
Straw Fiber Density	lbs/yd ²	0.5
Bottom Net Weight	lbs/1,000 ft ²	1.5
Anchoring	Anchors/yd ²	1.5

- B. Long-term (more than 12 month functional longevity) Erosion Control Blankets.
1. The blanket shall be constructed of straw fiber and coconut fiber combination, with a minimum coconut content of 30%.
 2. Stitching shall be photodegradable thread.
 3. The blanket shall be double-net construction.
 4. Contractor shall prepare soil according to the grading, seeding, fertilization and restoration requirements of the contract documents, prior installing erosion control blankets.
 5. Installation of erosion control blankets shall conform to the details provided in the Contract Documents.
 6. Anchoring shall be by means of 8” to 12” staples or pins and installed per manufacturers recommendations for specific application.
 7. The blanket shall conform to the minimum requirements listed in the following table:

Erosion Control Blanket Requirements		
Long-Term Installation (6 - 12 Months Functional Longevity)		
Physical Property	Unit	Min. Value
Top Net Weight	lbs/1,000 ft ²	3
Straw Fiber Density	lbs/yd ²	0.35
Coconut Fiber Density	lbs/yd ²	0.15
Bottom Net Weight	lbs/1,000 ft ²	1.5
Anchoring	Anchors/yd ²	2

2.5 ROCK CHECK DAMS

A. Provide rock check dams as indicated on Drawings. Alternative ditch check materials include staked straw bale dikes and pre-fabricated silt dikes as approved by the Engineer.

B. Materials

1. A nonwoven geotextile fabric, conforming to the requirements of the following table, shall be used for separation of subbase and base aggregate materials.

Non-Woven Geotextile Fabric Requirements			
Rock Check Dam Installation			
Physical Property	Test Method	Unit	Min. Value
Grab Tensile Strength	ASTM D 4632	lbs.	200
Grab Tensile Elongation	ASTM D 4632	%	50
Puncture Strength	ASTM D 4833	lbs.	500
Apparent Opening Size (AOS)	ASTM D 4751	U.S. Sieve	#80
Flow Rate	ASTM D 4491	gal/min/ft ²	95

2. The aggregate shall be as defined below for revetment riprap, must be crushed stone and must meet the following gradations.

Revetment Riprap Gradation	
Size, In. (mm)	Revetment
30 (750)	
24 (600)	
18 (450)	100
12 (300)	90-100
8 (200)	
6 (150)	20-40
3 (75)	0-10
1 (25)	
Depth of Riprap, minimum	18 in. (450 mm)

C. Installation

1. Excavate a cutoff trench into the channel bottom and ditch banks, extending it a minimum of 18 inches beyond the top of the ditch bank.
2. Install and anchor filter fabric in the channel and cutoff trench.
3. Place riprap in the cutoff trench and channel to the lines and dimensions shown on the Drawings. The center of each dam must be at least nine inches lower than the uppermost points of contact between the riprap dam and channel banks.
4. Extend the riprap at least 18 inches beyond the top of the channel banks to keep overflow water from eroding areas adjacent to the channel banks before it re-enters the channel.

5. Place filter medium on the up-slope side of the dam. Place filter medium over the entire face of the dam up to the base of the overflow weir notch.
6. Stabilize the channel above the uppermost dam.

D. Maintenance

1. Contractor shall immediately notify Engineer if significant erosion occurs between dams.
2. Remove accumulated sediment when it reaches one-half the height of the dam to maintain channel capacity, allow drainage through the dam, and prevent large flow from displacing sediment.
3. Add riprap and aggregate as needed to maintain design height and cross section of the dams.
4. When dams are no longer needed, remove the riprap and aggregate and stabilize the channel banks.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION AND MAINTENANCE OF EROSION AND SEDIMENTATION CONTROL

- A. All erosion and sediment control items shall be installed in strict conformance with the manufacturer's instructions for proprietary items.
- B. Prior to site work, erosion control measures shall be installed to control erosion and prevent sediment laden water from exiting the site. This shall include, but not be limited to, the installation of temporary earthen berms, silt fences, filter curtains, riprap, drainage piping, catch basins, inlet protection and other items that are needed to control sediment.
- C. Both temporary and final seeding is required. Should any areas outside of the project area remain inactive for a period of 14 days or more, it shall be seeded with a temporary or permanent vegetative cover such as oats, wheat or rye.
- D. Construction operations shall be carried out in such a manner and sequence that erosion shall be minimized and held within acceptable limits. It is important that material excavated from this Project be contained.

3.2 INSPECTION AND MAINTENANCE SCHEDULE

- A. The Project area shall be inspected no less than once per week, and after every rainfall event. Deficiencies and damages to the erosion control measures must be rectified within 24 hours.

THE FOLLOWING EROSION CONTROL SCHEDULE SHALL BE USED FOR THIS PROJECT: CONTROL MEASURE	INSTALLATION SEQUENCE	INSPECTION AND MAINTENANCE
Construction Entrance	Prior to Clearing and Grading	Minimum of 1 Entrance shall be Provided
Silt Fence Perimeter Protection	Prior to Clearing and Grading	Weekly, after Storm Events and as Needed
Temporary Seeding	After Rough Grading	Water as Needed
Permanent Seeding	After Finish Grading	Water as Needed
Erosion Control Matting (Blankets)	After Finish Grading	Weekly, after Storm Events and as Needed
Soil Stabilization (Seeding)	After Finish Grading Around Finished Inlets	Water as Needed
Removal of Perimeter Protection	After All Areas Draining to These Areas Are Stabilized	N/A

END OF SECTION 312500

SECTION 321123 - AGGREGATE BASE

PART 1 - GENERAL

1.1 SUMMARY:

- A. This work shall consist of furnishing and placing one or more courses of rollstone base on a prepared subgrade in accordance with these specifications and in conformity with the lines, grades, thickness, and typical cross sections shown on the Plans.

1.2 QUALITY ASSURANCE:

- A. APPLICABLE STANDARD: MoDOT
- B. INSPECTION SERVICE: The Owner will inspect for quality control testing during construction.

1.3 SUBMITTALS:

- A. Within thirty (30) calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
- B. Certificates, signed by the materials producer and the asphalt paving subcontractor, stating that materials meet or exceed the specified requirements.

1.4 JOB LIMITATIONS: Base course must not be put on a frozen subgrade.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Type 1 Aggregate for base shall consist of crushed stone, sand and gravel or reclaimed asphalt or concrete. The aggregate shall not contain more than 15 percent deleterious rock and shale. The fraction passing No. 40 sieve shall have a maximum plasticity index of six. Any sand, silt and clay and any deleterious rock and shale shall be uniformly distributed throughout the material. The aggregate shall be in accordance with the following gradation requirements:

Passing 1 inch sieve	100%
Passing 1/2 inch sieve	60-90%
Passing No. 4 sieve	35-60%
Passing No. 30 sieve	10-35%

- B. Type 5 Aggregate for base shall consist of crushed stone, sand and gravel or reclaimed asphalt or concrete. The aggregate shall not contain more than 15 percent deleterious rock and shale. The fraction passing No. 40 sieve shall have a maximum plasticity index not to exceed six. Any sand, silt and clay and any deleterious rock and shale shall be uniformly distributed throughout the material. The aggregate shall be in accordance with the following gradation requirements:

Passing 1 inch sieve	100%
Passing 1/2 inch sieve	60-90%

Passing No. 4 sieve	35-60%
Passing No. 30 sieve	10-35%
Passing No. 200 sieve	0-15%

- C. Type 7 Aggregate for base shall consist of crushed stone, sand and gravel or reclaimed asphalt or concrete. The aggregate shall not contain more than 15 percent deleterious rock and shale. The fraction passing No. 40 sieve shall have a maximum plasticity index not to exceed six. Any sand, silt and clay and any deleterious rock and shale shall be uniformly distributed throughout the material. The aggregate shall be in accordance with the following gradation requirements:

Passing 1 1/2 inch sieve	100%
Passing 1 inch sieve	70-100%
Passing No. 8 sieve	15-50%
Passing No. 200 sieve	0-12%

PART 3 - EXECUTION

3.1 SUBGRADE:

- A. The subgrade shall conform with the requirements of Section 312313 of these specifications before any aggregate is laid for the base.

3.2 MIXING: Section 304.3.3, MODOT

3.3 PLACING: Section 304.3.4, MODOT

3.4 SHAPING AND COMPACTING:

- A. Section 304.3.5, MODOT
- B. Rolled to 4" thickness.
- C. Shape to grades and test to Owner's satisfaction.

3.5 MAINTENANCE: Section 304.3.6, MODOT

END OF SECTION 321123

APPENDIX 1 – ACM SURVEY & REPORT

Asbestos Containing Materials Inspection

**New Elevator & Assembly
Ike Skelton Training Site – Military Education Facility
Jefferson City, Missouri**

October 2022

**Prepared For:
Connell Architecture, P.C.
2311 East Walnut Street, Suite B
Columbia, Missouri 65201-2003**



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1.0 BACKGROUND

Midwest Environmental Consultants (MEC) evaluated and sampled suspect asbestos containing materials on the interior and exterior of the Ike Skelton - Military Education Facility in Jefferson City, Missouri. The areas sampled included interior and exterior areas of the building to be renovated for the new construction of an elevator. Samples were taken in various locations, and of various materials through the project areas. The project consisted of a storage room, lobby and second floor office and the exterior of the building associated with those respective rooms.

Building material that contains more than 1 percent (%) asbestos is considered an asbestos containing material (ACM). There are three categories of ACMs:

- Friable asbestos material, which means it can be crumbled, pulverized, or reduced to powder by hand pressure. An example would be sprayed on acoustical ceiling material.
- Category I non-friable materials. Examples would be resilient floor covering and asphalt roofing materials.
- Category II non-friable materials. An example would be transite house siding.

Regulated asbestos containing materials (RACM) according to National Emissions Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61, Subpart M are:

- Friable asbestos materials that contain more than 1 percent asbestos.
- Category I non-friable asbestos materials that contain more than 1 percent asbestos that have become friable or will be or has been subject to sanding, grinding, cutting, abrading, or burning.
- Category II non-friable asbestos materials that contain more than 1 percent asbestos that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by demolition or renovation operations.

In general accordance with the NESHAP, currently enforced by the Missouri Department of Natural Resources (MDNR), prior to renovation or demolition, structures must be surveyed for the presence of ACMs by a Missouri licensed asbestos inspector. Included in **Appendix 1** is MEC's asbestos inspector's certification.

Additionally, Occupational Safety and Health Administration (OSHA) 29 CFR 1926.1101 Asbestos (in construction) Standard, contains specific requirements for owners of buildings concerning asbestos. These requirements include the presumption that certain materials are asbestos containing, or confirmation that certain materials are asbestos containing by sampling and laboratory analysis.

2.0 SAMPLING

The Project area of the building consisted of a storage room, lobby, and office for the Missouri National Guard. Nineteen samples, 27 layers, of different materials from different areas of the building were analyzed. The samples consisted of different materials observed in various areas of the Project that have the potential of containing asbestos. Samples were only taken from portions of the building that are being disturbed during remodeling. Materials planned for remodeling included flooring, drywall, ceiling, and trim materials. Also, exterior window caulking samples were taken because new doorways through the exterior of the building will be constructed. The

cinderblock walls were also inspected for suspect material to see if vermiculite was contained inside the brick. No vermiculite or other material were found in the cinder blocks.

The following is a general list of some suspect asbestos containing materials that were observed:

- Floor tile
- Drywall and joint compound
- Drop ceiling tile
- Caulking
- Base Trim

In all instances sampling was conducted in accordance with the asbestos NESHAP protocols. The sampling did not include items that were not visible or outside the planned construction area. MEC identified functional spaces and homogeneous areas in the building. Diagrams of the ACM sampling locations, both interior and exterior, are included in **Appendix 2**.

3.0 LABORATORY IDENTIFICATION

Samples were submitted to Schneider Laboratories, Inc., a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory, for identification by Polarized Light Microscopy (PLM). PLM is the United States Environmental Protection Agency (USEPA) recommended method for bulk sample analysis. The analytical results are included in **Appendix 3**.

4.0 FINDINGS

The findings section addresses the samples that tested positive for asbestos. All the samples, both interior and exterior, tested negative for containing asbestos. Refer to the Asbestos Survey Summary included in **Appendix 3** for the type and location of samples taken.

5.0 CONCLUSION

NESHAP notification is required for all demolition or renovation activities of regulated structures, which require the removal or disturbance of at least 160 square feet or 260 linear feet or 35 cubic feet of friable and/or Category I and Category II non-friable ACM that will be rendered friable during removal, disturbance or disposal. These projects require notification to the Missouri Department of Natural Resources' (MDNR) Air Pollution Control Program at least 10 working days in advance of the start of a regulated asbestos abatement project. A second type of notification is a demolition notification. A 10-day demolition notice is required for the demolition of any regulated structure. The notice is required even if there is no asbestos identified in the structure. Please refer to the MDNR *Asbestos Requirements for Demolition and Renovation Projects* in **Appendix 4** for additional information.

NESHAP and the MDNR require that friable ACM be removed before demolition or renovation. The MDNR recommends that Category I non-friable ACM, which might be rendered friable by demolition, be removed. The MDNR requires that threshold quantities of Category II non-friable ACM that will be impacted must be removed prior to demolition or renovation activities. A State of Missouri registered abatement contractor must remove the friable ACM, which is a RACM.

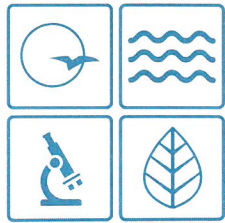
OSHA has specific work practice standards for friable and non-friable Category I and Category II asbestos-containing materials. While the removal of non-friable materials may not be regulated by the MDNR, the material can still pose a safety risk if handled improperly. For any project involving asbestos, whether regulated by the department or not, the use of trained asbestos professionals that are familiar with OSHA standards should be considered for any work involving asbestos.



Ryan Ortvals
Certification # 7118061422MOIR18362

APPENDIX 1

Asbestos Inspector's Certification



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Michael L. Parson
Governor

Dru Buntin
Director

June 23, 2022

Ryan A Ortvals
2009 E McCarty Street, Suite 2
Jefferson City, MO 65101

RE: Missouri Asbestos Occupation Certification Card

Enclosed is your certification card for Asbestos Inspector, as issued by the Asbestos Unit of the Missouri Department of Natural Resources' Air Pollution Control Program.

Missouri Certification Number: 7118061422MOIR18362

Course Training Date: June 14, 2022

Missouri Certification Approval Date: June 23, 2022

Missouri Certification Expiration Date: June 23, 2023

Note:

- All Missouri-certified asbestos personnel must comply with the following statutes and regulations:
 - Sections 643.225 to 643.250, RSMo;
 - 10 CSR 10-6.241 *Asbestos Projects-Registration, Abatement, Notification, Inspection, Demolition, and Performance Requirements; and*
 - 10 CSR 10-6.250 *Asbestos Projects-Certification, Accreditation and Business Exemption Requirements.*
- To keep your occupation certification up-to-date, you must complete an annual refresher course and submit a renewal application each year.
- In order to be eligible to renew your certification, you must successfully complete a refresher course with a Missouri-accredited training provider within 12 months of the expiration date of your current training certificate. If you exceed this grace period, you will be required to retake a Missouri-accredited initial course in order to be eligible for Missouri certification.

To obtain a copy of the certification renewal application, or review regulations and requirements, please visit our website at <http://dnr.mo.gov/env/apcp/asbestos/index.htm>.

If you have any questions please call the Air Pollution Control Program at 573-751-4817.

AIR POLLUTION CONTROL PROGRAM

Director of Air Pollution Control Program

PO Box 176, Jefferson City, MO 65102-0176 • dnr.mo.gov



APPENDIX 2

Diagram of Sample Locations

Sample Locations

STATE OF MISSOURI
MICHAEL L. PARSON,
GOVERNOR



REGISTERED ARCHITECT, LICENSE NO. 0000000000

ARCHITECTURAL CORPORATION
CONNELL ARCHITECTURE, P.C.
2311 East Walnut Street
Suite B
Columbia, Missouri 65201
Cell: 573-268-6166
Office: 573-875-2455
info@connellarchitecture.com



OFFICE OF
ADMINISTRATION
DIVISION OF FACILITIES
DESIGN AND CONSTRUCTION

MISSOURI NATIONAL GUARD

DESIGN & CONSTRUCT
ELEVATOR & ASSEMBLY

MILITARY EDUCATION FACILITY
IKEE SKEELTON TRAINING SITE
2303 MILITARY DRIVE
JEFFERSON CITY, MO 65101

PROJECT No. T2211-01
SITE No. 6300
ASSET No. 8156300012

REVISION:
DATE:
REVISION:
DATE:
REVISION:
DATE:
ISSUE DATE: 8/19/2022

CLIENT: MILITARY EDUCATION FACILITY
DRAWN BY: JAL
CHECKED BY: JAL
DESIGNED BY: JAL

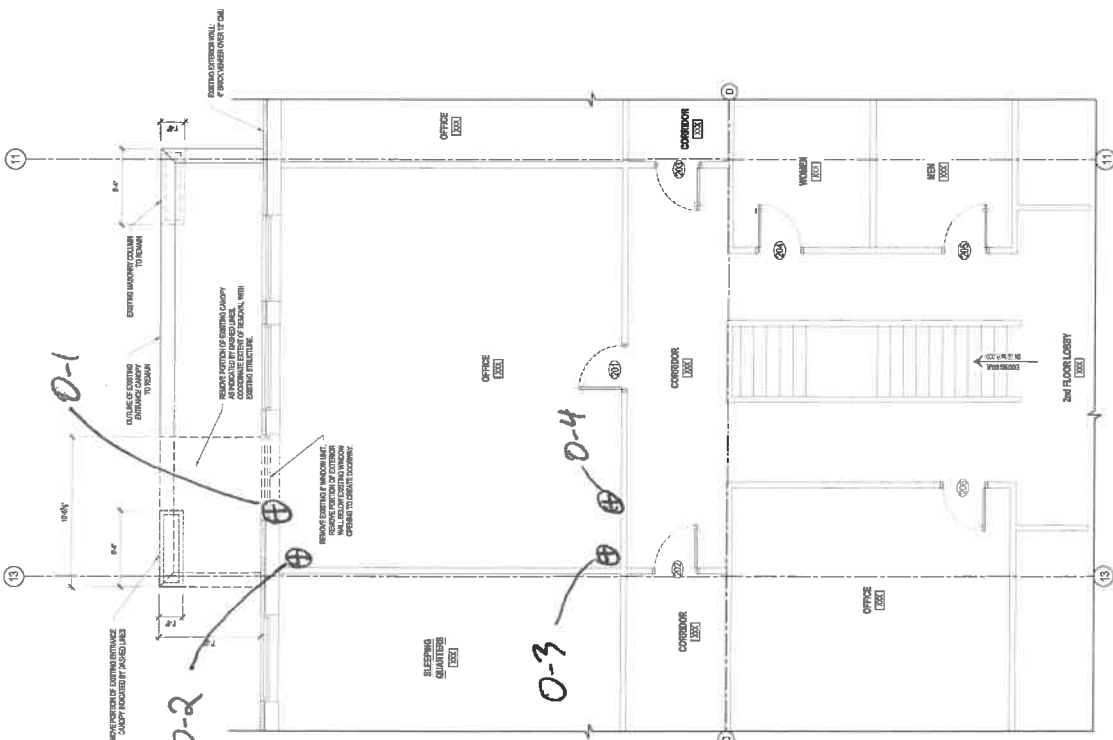
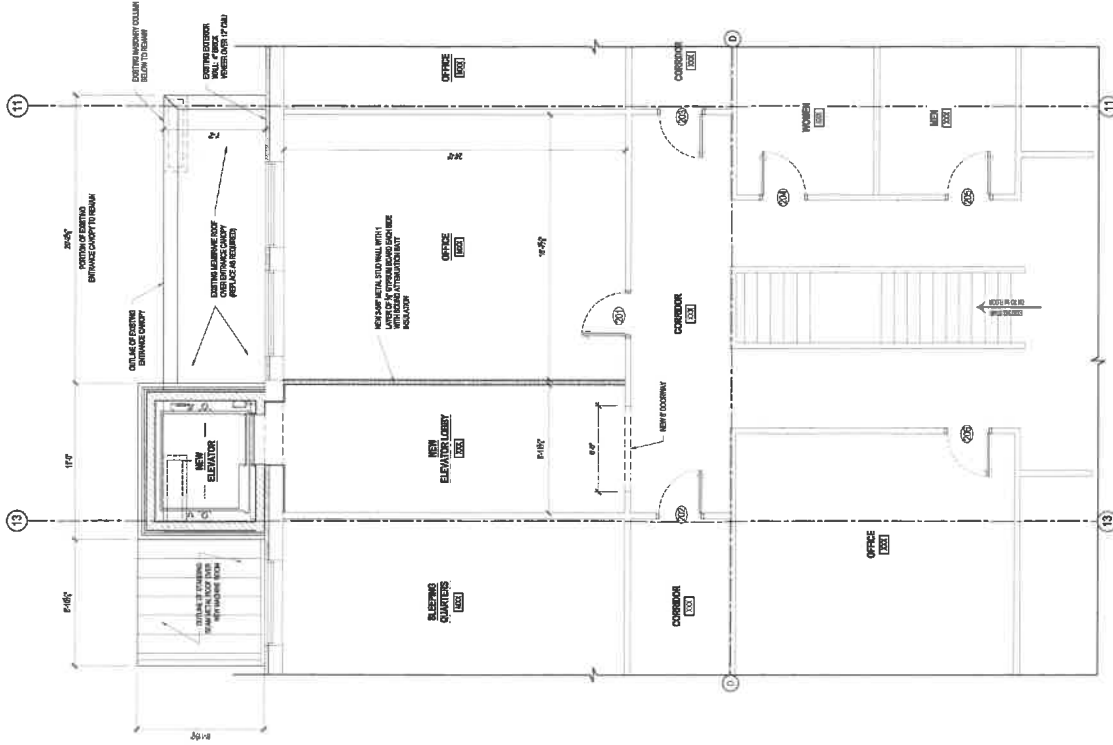
SHEET TITLE:

NEW ELEVATOR & ASSEMBLY
MILITARY EDUCATION FACILITY
2nd FLOOR PLANS

SHEET NUMBER:

A-103

6 OF 9
ISSUE DATE: 8/19/2022



SD SUBMITTAL

OPTION #2 - 2nd FLOOR PLAN - ALTERATIONS
SCALE: 1/4" = 1'-0"

OPTION #2 - 2nd FLOOR PLAN - DEMOLITION
SCALE: 1/4" = 1'-0"

NOTE:
ALL DIMENSIONS ARE TO FACE OF CONCRETE, MASONRY,
OR FRAMING UNLESS OTHERWISE NOTED

ASSUMED BENCHMARK ELEVATION:
TOP OF 1st FLOOR = 100'-0"

COORDINATE BENCHMARK WITH ACTUAL ELEVATIONS

APPENDIX 3

Asbestos Summary Sheet and Analytical Results

Asbestos Survey Summary - Ike Skelton Training Site - Military Education Facility

Homogenous Area	Type of Material Aprox Quantity	Sample I.D.- MEC I.D.	Location of Sample	Friable/ Non-Friable	Asbestos		Condition ³	Potential for Disturbance
					Type ¹	Percent ²		
Military Education Building	Cove Base with Mastic	SR-1	Storage Room	Non-Friable	M	ND	Good	High
Military Education Building	Tile Flooring with Mastic	SR-2	Storage Room	Non-Friable	M	ND	Good	High
Military Education Building	Cove Base with Mastic	SR-3	Storage Room	Non-Friable	M	ND	Good	High
Military Education Building	Tile Flooring with Mastic	SR-4	Storage Room	Non-Friable	M	ND	Good	High
Military Education Building	Interior Window Caulk	SR-5	Storage Room	Non-Friable	M	ND	Good	High
Military Education Building	Interior Window Caulk	SR-6	Storage Room	Non-Friable	M	ND	Good	High
Military Education Building	Cove Base with Mastic	SR-7	Storage Room	Non-Friable	M	ND	Good	High
Military Education Building	Tile Flooring with Mastic	SR-8	Storage Room	Non-Friable	M	ND	Good	High
Military Education Building	Ceiling Tile	V-1	1st Floor Lobby	Friable	M	ND	Good	High
Military Education Building	Ceiling Tile	V-2	1st Floor Lobby	Friable	M	ND	Good	High
Military Education Building	Ceiling Tile	V-3	1st Floor Lobby	Friable	M	ND	Good	High
Military Education Building	Interior Window Caulk	V-4	1st Floor Lobby	Non-Friable	M	ND	Good	High
Military Education Building	Interior Window Caulk	O-1	2nd Floor Office	Non-Friable	M	ND	Good	High

1 - M=Miscellaneous / S=Surfacing 2 - ND= Non Detect 3 - Good Condition / D=Damaged

Asbestos Survey Summary -

Homogenous Area	Type of Material Aprox Quantity	Sample I.D.- MEC I.D.	Location of Sample	Friable/ Non-Friable	Asbestos		Condition ³	Potential for Disturbance
					Type ¹	Percent ²		
Military Education Building	Carpet with Mastic	O-2	2nd Floor Office	Non-Friable	M	ND	Good	High
Military Education Building	Carpet with Mastic	O-3	2nd Floor Office	Non-Friable	M	ND	Good	High
Military Education Building	Drywall	O-4	2nd Floor Office	Friable	M	ND	Good	High
Military Education Building	Exterior Window Caulk	E-1	Storage Room Exterior Window	Non-Friable	M	ND	Good	High
Military Education Building	Exterior Window Caulk	E-2	Storage Room Exterior Window	Non-Friable	M	ND	Good	High
Military Education Building	Exterior Window Caulk	E-3	Lobby Exterior Window	Non-Friable	M	ND	Good	High

1 - M=Miscellaneous / S=Surfacing 2 - ND= Non Detect 3 - Good Condition / D=Damaged



Customer: Midwest Environmental Consultants (3553)
Address: 2009 E McCarty Street, Ste. 2
Jefferson City, MO 65101

Order #:	492623
-----------------	--------

Received 10/20/22
Analyzed 10/24/22
Reported 10/25/22

Attn:

Project: Ike Skelton Elevator Asb/Lead
Location: Military Educational Building
Number:

Method: EPA 600/R-93/116 & 40 CFR App. E Sub. E Pt. 763

PLM Analysis

Sample ID	Collected	Cust. ID	Location	Asbestos Fibers	Other Materials
492623-001	10/12/22	SR - 1	Military Educational Bldg		
Layer 1:	Cove Base			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Gray, Rubbery				
Layer 2:	Mastic			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Tan, Soft				
492623-002	10/12/22	SR - 2	Military Educational Bldg		
Layer 1:	Flooring			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Gray, Organically Bound				
Layer 2:	Mastic			No Asbestos Detected	2% CELLULOSE FIBER
	Black, Bituminous				98% NON FIBROUS MATERIAL
492623-003	10/12/22	SR - 3	Military Educational Bldg		
Layer 1:	Cove Base			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Gray, Rubbery				
Layer 2:	Mastic			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Tan, Soft				
492623-004	10/12/22	SR - 4	Military Educational Bldg		
Layer 1:	Flooring			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Gray, Organically Bound				
Layer 2:	Mastic			No Asbestos Detected	2% CELLULOSE FIBER
	Black, Bituminous				98% NON FIBROUS MATERIAL

Reporting Limit: 1% Gravimetrically Reduced Reporting Limit: 0.01% PLM analysis is based on Visual Estimation and NESHAP recommends that any friable sample with an asbestos content less than 10 percent be verified by Point Count or TEM Analysis. The EPA recommends that any attic loose fill vermiculite should be treated as asbestos containing material. This report must not be reproduced except in full with the approval of the laboratory. The test results apply to the sample as received.

Project: Ike Skelton Elevator Asb/Lead
Location: Military Educational Building
Number:

Method: EPA 600/R-93/116 & 40 CFR App. E Sub. E Pt. 763

PLM Analysis

Sample ID	Collected	Cust. ID	Location	Asbestos Fibers	Other Materials
492623-005	10/12/22	SR - 5	Military Educational Bldg		
Layer 1:	Window Caulking			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Brown, Soft				
492623-006	10/12/22	SR - 6	Military Educational Bldg		
Layer 1:	Window Caulking			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Brown, Soft				
492623-007	10/12/22	SR - 7	Military Educational Bldg		
Layer 1:	Cove Base			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Gray, Rubbery				
Layer 2:	Mastic			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Tan, Soft				
492623-008	10/12/22	SR - 8	Military Educational Bldg		
Layer 1:	Flooring			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Gray, Organically Bound				
Layer 2:	Mastic			No Asbestos Detected	2% CELLULOSE FIBER
	Black, Bituminous				98% NON FIBROUS MATERIAL
492623-009	10/12/22	V-1	Military Educational Bldg		
Layer 1:	Ceiling Tile			No Asbestos Detected	40% CELLULOSE FIBER
	Beige, Fibrous				40% MINERAL/GLASS WOOL
					20% NON FIBROUS MATERIAL
492623-010	10/12/22	V-2	Military Educational Bldg		
Layer 1:	Ceiling Tile			No Asbestos Detected	40% CELLULOSE FIBER
	Beige, Fibrous				40% MINERAL/GLASS WOOL
					20% NON FIBROUS MATERIAL
492623-011	10/12/22	V-3	Military Educational Bldg		
Layer 1:	Ceiling Tile			No Asbestos Detected	40% CELLULOSE FIBER
	Beige, Fibrous				40% MINERAL/GLASS WOOL
					20% NON FIBROUS MATERIAL
492623-012	10/12/22	V-4	Military Educational Bldg		
Layer 1:	Window Caulk			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Brown, Soft				
492623-013	10/12/22	O-1	Military Educational Bldg		
Layer 1:	Window Caulk			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Brown, Soft				

Reporting Limit: 1% Gravimetrically Reduced Reporting Limit: 0.01% PLM analysis is based on Visual Estimation and NESHAP recommends that any friable sample with an asbestos content less than 10 percent be verified by Point Count or TEM Analysis. The EPA recommends that any attic loose fill vermiculite should be treated as asbestos containing material. This report must not be reproduced except in full with the approval of the laboratory. The test results apply to the sample as received.

Project: Ike Skelton Elevator Asb/Lead
 Location: Military Educational Building
 Number:

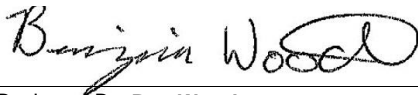
Method: EPA 600/R-93/116 & 40 CFR App. E Sub. E Pt. 763

PLM Analysis

Sample ID	Collected	Cust. ID	Location	Asbestos Fibers	Other Materials
492623-014	10/12/22	O-2	Military Educational Bldg		
Layer 1:	Carpet			No Asbestos Detected	10% NON FIBROUS MATERIAL
	Gray/Blue, Fibrous				90% SYNTHETIC FIBER
Layer 2:	Mastic			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Tan, Soft				
492623-015	10/12/22	O-3	Military Educational Bldg		
Layer 1:	Carpet			No Asbestos Detected	10% NON FIBROUS MATERIAL
	Gray/Blue, Fibrous				90% SYNTHETIC FIBER
Layer 2:	Mastic			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Tan, Soft				
492623-016	10/12/22	O-4	Military Educational Bldg		
Layer 1:	Drywall			No Asbestos Detected	5% CELLULOSE FIBER
	White, Powdery				95% NON FIBROUS MATERIAL
492623-017	10/12/22	E-1	Military Educational Bldg		
Layer 1:	Window Caulk			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Brown, Soft				
492623-018	10/12/22	E-2	Military Educational Bldg		
Layer 1:	Window Caulk			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Brown, Soft				
492623-019	10/12/22	E-3	Military Educational Bldg		
Layer 1:	Window Caulk			No Asbestos Detected	100% NON FIBROUS MATERIAL
	Brown, Soft				

EPA Regulatory Limit: 1%
 Total layers analyzed on order: 27


 Analyst **Mohammed Hashim**

492623-10/25/22 04:32 PM

 Reviewed By: **Ben Wood**
 Laboratory Director

Reporting Limit: 1% Gravimetrically Reduced Reporting Limit: 0.01% PLM analysis is based on Visual Estimation and NESHAP recommends that any friable sample with an asbestos content less than 10 percent be verified by Point Count or TEM Analysis. The EPA recommends that any attic loose fill vermiculite should be treated as asbestos containing material. This report must not be reproduced except in full with the approval of the laboratory. The test results apply to the sample as received.



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2512 West Cary Street, Richmond, Virginia 23220-5117
 804-353-6778 • 800-785-LABS (5227) • Fax 804-359-1475
 www.slabinc.com • info@slabinc.com

R 21

492623

V:\492\492623

kfinnemore 10/20/2022 9:13:51 AM
 UPS 1Z2E28999094369930

Submitting Co. Midwest Environmental Consultants		State of Collection Missouri	Cell Required <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
2009 East McCarty Street, Suite 2		Phone	
Jefferson City, MO 65101		Email rortbals@mecpc.com	
Project Name Ike Skelton Elevator Asbestos/Lead Sampling	PO #		
Project Location Military Educational Building - JC	Special Instructions:		
Project Number			
Collected By Ryan Ortbals			

Turn Around Time	Matrix	Tests/Analytes (all or All that Apply) Blank spaces are for additional analytes			
<input type="checkbox"/> 2 Hour * <input type="checkbox"/> Same day * <input type="checkbox"/> 1 business day <input type="checkbox"/> 2 business days <input checked="" type="checkbox"/> 3 business days <input type="checkbox"/> 5 business days <small>* not available for all tests ** past 3 PM the TAT will begin next business day Please schedule rush tests in advance</small>	<input type="checkbox"/> Air <input type="checkbox"/> Paint <input type="checkbox"/> Soil <input type="checkbox"/> Wipe <input checked="" type="checkbox"/> Bulk <input type="checkbox"/> Waste Water <input type="checkbox"/> Ground Water <input type="checkbox"/> Drinking Water <input type="checkbox"/> TSP / PM10 <input type="checkbox"/> _____	Asbestos in Bulk <input checked="" type="checkbox"/> PLM <input type="checkbox"/> PLM Qualitative <input type="checkbox"/> 400 Point Count <input type="checkbox"/> 1000 Point Count <input type="checkbox"/> Gravimetric Prep	Metals Total <input type="checkbox"/> Lead <input type="checkbox"/> RCRA 8 Metals <input type="checkbox"/> Chromium VI <input type="checkbox"/> Mercury <input type="checkbox"/> _____	TCLP <input type="checkbox"/> Lead <input type="checkbox"/> RCRA 8 Metals <input type="checkbox"/> Full TCLP <small>(w/ organics 10 Day)</small>	Microbiology <input type="checkbox"/> BACT (MPN/PA) <input type="checkbox"/> Mold Direct Exam <input type="checkbox"/> Allergens <hr/> Sub-Contract <input type="checkbox"/> TEM Chatfield <input type="checkbox"/> TEM AHERA <input type="checkbox"/> TEM 7402 <input type="checkbox"/> Silica XRD (7500)
		Asbestos in Air <input type="checkbox"/> PCM <input type="checkbox"/> PCM-B Rules	Gravimetric <input type="checkbox"/> Total Dust NIOSH 0500 <input type="checkbox"/> Resp. Dust NIOSH 0600	Miscellaneous <input type="checkbox"/> Silica FTIR (7602) <input type="checkbox"/> _____	

Sample #	Date Sampled	Time Sampled	Sample Identification (Employee, Bldg, Material, Type ¹)	Wipe Area	Time		Flow Rate		Total Air ⁴
					Start	Stop	Start	Stop	
SR-1	10/12/22	1:30	Cove Base w/ Mastic						
SR-2	10/12/22	1:30	Tile Flooring w/ Mastic						
SR-3	10/12/22	1:35	Cove Base w/ Mastic						
SR-4	10/12/22	1:35	Tile Flooring w/ Mastic						
SR-5	10/12/22	1:40	Interior Window Caulk						
SR-6	10/12/22	1:40	Interior Window Caulk						
SR-7	10/12/22	1:45	Cove Base w/ Mastic						
SR-8	10/12/22	1:45	Tile Flooring w/ Mastic						
V-1	10/12/22	1:55	Ceiling Tile						
V-2	10/12/22	1:55	Ceiling Tile						

For Aqueous and Solid samples ensure enough sample is sent for duplicate and spike analysis

¹Type: A=Area, B=Blank, P=Personal, E=Excursion ²Beginning/End of Sample Period ³Liters/Minute ⁴Volume in Liters [time in min x flow in L/min]

Relinquished By: Ryan Ortbals Signature: [Signature] Date/Time 10/19/2022 / 3:30 pm

ALL SHADED FIELDS MUST BE FILLED TO AVOID DELAYS



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 www.slabinc.com • info@slabinc.com

Subcontracting Co. Midwest Environmental Consultants		State of Collection Missouri		For Required <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
2009 East McCarty Street, Suite 2		Phone		
Jefferson City, MO 65101		Email rortbals@mecpc.com		
Project Name	Ike Skelton Elevator Asbestos/Lead Sampling		PO #	
Project Location	Military Educational Building - JC			
Project Number				
Collected By	Ryan Ortbals			
Special Instructions:				

Turn Around Time	Matrix	Tests/Analytes (Select All that Apply) Blank matrices for additional analytes			
<input type="checkbox"/> 2 Hour * <input type="checkbox"/> Same day * <input type="checkbox"/> 1 business day <input type="checkbox"/> 2 business days <input checked="" type="checkbox"/> 3 business days <input type="checkbox"/> 5 business days <small>* not available for all tests</small> <small>** past 3 PM the TAT will begin next business day</small> <small>Please schedule rush tests in advance</small>	<input type="checkbox"/> Air <input type="checkbox"/> Paint <input type="checkbox"/> Soil <input type="checkbox"/> Wipe <input checked="" type="checkbox"/> Bulk <input type="checkbox"/> Waste Water <input type="checkbox"/> Ground Water <input type="checkbox"/> Drinking Water <input type="checkbox"/> TSP / PM10 <input type="checkbox"/> _____	Asbestos in Bulk	Metals Total	TCLP	Microbiology
		<input checked="" type="checkbox"/> PLM <input type="checkbox"/> PLM Qualitative <input type="checkbox"/> 400 Point Count <input type="checkbox"/> 1000 Point Count <input type="checkbox"/> Gravimetric Prep	<input type="checkbox"/> Lead <input type="checkbox"/> RCRA 8 Metals <input type="checkbox"/> Chromium VI <input type="checkbox"/> Mercury <input type="checkbox"/> _____	<input type="checkbox"/> Lead <input type="checkbox"/> RCRA 8 Metals <input type="checkbox"/> Full TCLP <small>(w/ organics 10 Day)</small>	<input type="checkbox"/> BACT (MPN/PA) <input type="checkbox"/> Mold Direct Exam <input type="checkbox"/> Allergens
		Asbestos in Air	Gravimetric	Miscellaneous	Sub-Contract
		<input type="checkbox"/> PCM <input type="checkbox"/> PCM-B Rules	<input type="checkbox"/> Total Dust NIOSH 0500 <input type="checkbox"/> Resp. Dust NIOSH 0600	<input type="checkbox"/> Silica FTIR (7602) <input type="checkbox"/> _____	<input type="checkbox"/> TEM Chatfield <input type="checkbox"/> TEM AHERA <input type="checkbox"/> TEM 7402 <input type="checkbox"/> Silica XRD (7500)

Sample ID	Date Sampled	Time Sampled	Sample Identification (Employee, Bldg, Material, Type ¹)	Wipe Area	Time		Flow Rate		Total Air ⁴
					Start	Stop	Start	Stop	
V-3	10/12/22	1:55	Ceiling Tile						
V-4	10/12/22	2:00	Interior Window Caulk						
O-1	10/12/22	2:05	Interior Window Caulk						
O-2	10/12/22	2:10	Carpet w/ Mastic						
O-3	10/12/22	2:10	Carpet w/ Mastic						
O-4	10/12/22	2:15	Drywall						
E-1	10/12/22	2:25	Exterior Window Caulk						
E-2	10/12/22	2:25	Exterior Window Caulk						
E-3	10/12/22	2:25	Exterior Window Caulk						
	10/12/22								

For Aqueous and Solid samples ensure enough sample is sent for duplicate and spike analysis

¹Type: A=Area, B=Blank, P=Personal, E=Excursion ²Beginning/End of Sample Period ³Liters/Minute ⁴Volume in Liters [time in min x flow in L/min]

Relinquished By: Ryan Ortbals Signature: [Signature] Date/Time 10/19/2022 / 3:30

ALL SHADED FIELDS MUST BE FILLED TO AVOID DELAYS



SCHNEIDER LABORATORIES GLOBAL, INC.

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 804-353-6778 • 800-785-LABS (5227) • Fax 804-359-1475
 www.slabinc.com • info@slabinc.com

Submitting Co	Midwest Environmental Consultants	State of Collection	Missouri	Cap Required	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
2009 East McCarty Street, Suite 2		City		Phone	
Jefferson City, MO 65101		Email	rortbals@mecpc.com		
Project Name	Ike Skelton Elevator Asbestos/Lead Sampling	PO #			
Project Location	Military Educational Building - JC	Special Instructions:			
Project Number					
Collected By	Ryan Ortbals				

Turn Around Time	Matrix	Tests/Analytes (Select All that Apply) Blank spaces are for additional analytes			
<input type="checkbox"/> 2 Hour * <input type="checkbox"/> Same day * <input type="checkbox"/> 1 business day <input type="checkbox"/> 2 business days <input checked="" type="checkbox"/> 3 business days <input type="checkbox"/> 5 business days <small>* not available for all tests</small> <small>** past 3 PM the TAT will begin next business day</small> <small>Please schedule rush tests in advance</small>	<input type="checkbox"/> Air <input checked="" type="checkbox"/> Paint <input type="checkbox"/> Soil <input type="checkbox"/> Wipe <input type="checkbox"/> Bulk <input type="checkbox"/> Waste Water <input type="checkbox"/> Ground Water <input type="checkbox"/> Drinking Water <input type="checkbox"/> TSP / PM10 <input type="checkbox"/> _____	Asbestos in Bulk <input type="checkbox"/> PLM <input type="checkbox"/> PLM Qualitative <input type="checkbox"/> 400 Point Count <input type="checkbox"/> 1000 Point Count <input type="checkbox"/> Gravimetric Prep	Metals Total <input checked="" type="checkbox"/> Lead <input type="checkbox"/> RCRA 8 Metals <input type="checkbox"/> Chromium VI <input type="checkbox"/> Mercury <input type="checkbox"/> _____	TCLP <input type="checkbox"/> Lead <input type="checkbox"/> RCRA 8 Metals <input type="checkbox"/> Full TCLP <small>(w/ organics 10 Day)</small>	Microbiology <input type="checkbox"/> BACT (MPN/PA) <input type="checkbox"/> Mold Direct Exam <input type="checkbox"/> Allergens <hr/> Sub-Contract <input type="checkbox"/> TEM Chatfield <input type="checkbox"/> TEM AHERA <input type="checkbox"/> TEM 7402 <input type="checkbox"/> Silica XRD (7500)
		Asbestos in Air <input type="checkbox"/> PCM <input type="checkbox"/> PCM-B Rules	Gravimetric <input type="checkbox"/> Total Dust NIOSH 0500 <input type="checkbox"/> Resp. Dust NIOSH 0600	Miscellaneous <input type="checkbox"/> Silica FTIR (7602) <input type="checkbox"/> _____	

Sample ID	Date Sampled	Time Sampled	Sample Identification (Employee, Bldg, Material, Type ¹)	Wipe Area	Time		Flow Rate		Total Air ⁴
					Start	Stop	Start	Stop	
L-2	10/12/22	1:40	Paint						
L-3	10/12/22	1:50	Paint						

For Aqueous and Solid samples ensure enough sample is sent for duplicate and spike analysis

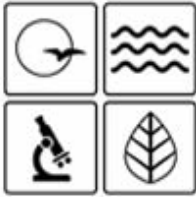
¹Type: A=Area, B=Blank, P=Personal, E=Excursion ²Beginning/End of Sample Period ³Liters/Minute ⁴Volume in Liters [time in min x flow in L/min]

Relinquished By: Ryan Ortbals Signature: [Signature] Date/Time 10/18/2022 / 3:20 pm

ALL SHADED FIELDS MUST BE FILLED TO AVOID DELAYS

APPENDIX 4

MDNR Asbestos Fact Sheet



Missouri Department of Natural Resources

Asbestos Requirements for Demolition and Renovation Projects

Air Pollution Control Program fact sheet

05/2017

Division of Environmental Quality Director: Ed Galbraith

PUB02157

Disclaimer: The statements in this document are intended solely as guidance. This document is not intended, nor can it be relied on, to create any rights enforceable by any party in litigation. This guidance may be revised without public notice to reflect changes in law, regulation or policy.

Introduction

This document is one in a series of fact sheets about the Missouri Department of Natural Resources' asbestos requirements. This particular document contains information regarding how to determine if your demolition or renovation project is regulated by the department's air pollution control requirements. It also will help explain the basic requirements for asbestos inspection and asbestos abatement as well as for notification of regulated demolition and renovation projects. In addition, it discusses requirements for disposing of asbestos waste.

Determining if Your Project Will Involve Regulated Structures

The first step in determining if your demolition or renovation project is regulated is to determine the type of structure that will be affected. The department regulates demolition and renovation projects involving institutional, commercial, public, industrial, or residential structures, installations or buildings. An exception to this regulation is a single residential structure that contains four or fewer dwelling units. Projects that involve two or more residential structures are not exempt. Two or more residential structures being demolished as part of an urban or rural renewal or an unsafe building abatement program are not exempt, regardless of their proximity to each other. Projects that involve demolition of two or more mobile homes are not exempt. If the structure has been used for any purpose other than residential, such as being converted from residential to commercial use or converted from commercial to residential use, it is not exempt. Any residential structure used in fire training exercises is not exempt.

Should a regulated structure be demolished by a catastrophic event, such as a tornado or accidental fire, the department's Air Pollution Control Program should be contacted for guidance.

Inspection Requirements

Prior to demolition or renovation activities, regulated structures or those areas that will be subject to demolition or renovation activities must be thoroughly inspected by a Missouri certified asbestos inspector to determine if any asbestos-containing materials are present. The inspector should identify all potential asbestos-containing (suspect) materials that may be disturbed by the demolition or renovation activity. Samples of the suspect materials should be collected and submitted for laboratory analysis to determine if they contain asbestos. The inspector should generate a report of his or her findings from the inspection. The report should identify all suspect materials present, and indicate the amount, location, category and condition of the suspect materials. The report should also include a copy of the analytical results and chain of custody for all samples collected.

If a regulated structure is structurally unsound, it may not be possible to thoroughly inspect the entire structure. An inspection should be performed in all areas of the structure where it is safe to do so. The final inspection report should clearly indicate what areas, if any, were not inspected. Areas of the building that were not inspected will require special handling during demolition.

A list of Missouri certified asbestos inspectors is available on the department's website at www.dnr.mo.gov/env/apcp/asbestos.htm.

Categories of Asbestos-Containing Materials

There are three categories of asbestos-containing materials that may be identified by an inspector.

- **Friable asbestos-containing material** - Any material containing more than one percent asbestos that, when dry, can be crumbled, pulverized or reduced to powder by hand pressure. Examples include sprayed or troweled-on materials such as acoustical ceiling spray or boiler insulation, paper pipe insulation and drop-in ceiling tile.
- **Category I nonfriable asbestos-containing material** - Asbestos-containing packings, gaskets, *resilient floor covering and asphalt roofing products containing more than one percent asbestos. *(Any asbestos-containing vapor barrier on resilient floor coverings such as sheet vinyl or tile is considered friable asbestos).
- **Category II nonfriable asbestos-containing material** - Any nonfriable material, other than Category I materials, containing more than one percent asbestos. Examples of Category II materials include asbestos cement wall or roof shingles and cement pipe.

Depending on the type or category of the asbestos-containing materials identified from the inspection and the forces that will eventually act upon them during demolition and renovation, the materials may or may not be regulated by the department's asbestos requirements. To determine the applicability of the department's asbestos requirements, you must determine if the asbestos from your project will meet the definition of regulated asbestos-containing material, or RACM.

RACM includes friable asbestos-containing materials; Category I nonfriable materials that have become or will become friable, or have been subject to sanding, grinding, cutting, burning, or abrading; or Category II nonfriable materials that have a high probability of becoming, or have become, crumbled, pulverized or reduced to powder by the work practices used during the course of demolition or renovation.

Requirements for Abatement of Regulated Asbestos-Containing Material

If the asbestos inspection determines 160 square feet, 260 linear feet, 35 cubic feet (threshold quantities), or more of RACM will be impacted by demolition or renovation activities, all of the RACM must be removed by a Missouri registered asbestos abatement contractor.

Abatement contractors are trained in the proper procedures for safely removing and disposing of asbestos-containing material and may only employ workers trained and subsequently, certified by the department to participate on a regulated project. A list of Missouri registered asbestos abatement contractors is available on the department's website at www.dnr.mo.gov/env/apcp/asbestos.htm.

If a building is structurally unsound and unsafe to enter, there may be provisions that would allow the building to be demolished without being inspected or having the RACM removed. In this event contact the Air Pollution Control Program.

Requirements for Abatement of Nonfriable Asbestos-Containing Materials

Most nonfriable materials are not considered RACM unless they are in poor condition or are rendered into RACM by the work practices during demolition or renovation. Category I nonfriable materials can generally be left in place during demolition activities provided the method of demolition will not make the material into RACM. However, for certain types of Category I materials, such as floor tile and linoleum, the department generally recommends removal prior to demolition because these materials could easily be rendered into RACM during the demolition process. Also, leaving these materials in place may increase the amount of material considered as asbestos waste and the cost of disposal. If Category I ACM is left in place, work practices must be implemented to ensure the material is not made into RACM during removal or demolition. Any activity that will result in the material being subject to sanding, grinding, cutting, abrading, or burning may cause the material to become subject to regulation, depending on the quantity involved.

If threshold quantities of Category II materials will be impacted, then they must be removed prior to demolition or renovation activities. This removal must be performed in a manner that does not render the material into RACM. If the material is crumbled, pulverized or reduced to powder during the demolition or removal process, the material

may become subject to regulation depending on the quantity involved.

The Occupational Safety and Health Administration, or OSHA, has specific work practice standards for friable and nonfriable Category I and Category II asbestos-containing materials. While the removal of nonfriable materials may not be regulated by the department, the material can still pose a safety risk if handled improperly. For any project involving asbestos, whether regulated by the department or not, the use of trained asbestos professionals that are familiar with OSHA standards should be considered for any work involving asbestos.

Notification Requirements

There are two types of notifications required by the department in regard to demolition and renovation projects, asbestos abatement project notification and demolition project notification. Asbestos abatement project notifications must be submitted to the department at least 10 working days prior to the start of a regulated asbestos abatement project. A copy of the asbestos inspection report and laboratory analytical results must accompany the notification. The notification period allows the department time to inspect the project and ensure it is being performed in compliance with all of the applicable requirements. A \$200 review fee is required for each notification of an asbestos abatement project.

Alternate notification provisions may apply in emergency situations. In this event contact the Air Pollution Control Program.

The second type of notification is demolition notification. Demolition notifications must be provided to the department at least 10 working days prior to the demolition of any regulated structure. A \$100 review fee is required for each demolition notification.

This notice is required even if there is no asbestos identified in the structure being demolished. This notification period provides the department the opportunity to inspect the structure prior to demolition to ensure all asbestos issues have been properly addressed. A copy of the asbestos inspection report and laboratory analytical results must accompany this notification. In the event a structure is in danger of imminent collapse and has been ordered demolished by a state or local government agency, the department can waive the 10 working day notification period. In this case, notice should be provided as early as possible before, but no later than the following working day. A copy of the government order must also be included with the notification.

It is the obligation of the owner and any contractors involved to ensure these notifications are provided to the department. Failure to submit the notification is a violation of the department's requirements. The department will issue a notice of receipt letter for all asbestos abatement and demolition project notifications. The notice of receipt letter will list any deficiencies in the notification of abatement or demolition.

Copies of the required notification forms are available on the department's website at www.dnr.mo.gov/env/apcp/asbestos.htm.

Asbestos Waste Disposal Requirements

Asbestos waste from regulated projects involving threshold quantities of RACM must be handled in strict accordance with the department's requirements for asbestos waste disposal. Wastes from these projects must be transferred to an approved sanitary landfill or transfer station by registered asbestos abatement contractors, who are trained in the provisions for proper waste disposal.

Non-friable asbestos-containing materials that are not made into RACM are not regulated by the department's asbestos requirements. However, this material is considered a solid waste and must be properly disposed of at an approved landfill or transfer facility in accordance with the Solid Waste Management Law. You should contact the facility where you plan to dispose of your asbestos waste for information on how the material should be packaged and delivered to their facility for disposal.

Asbestos Contact Information

For more information on the department's asbestos requirements, you may contact the department's Air Pollution Control Program or one of the department's other offices:

Local Agencies

In Missouri, there are two local agencies that have an agreement with the department to enforce Missouri's asbestos requirements as well as local ordinances. These local agencies are:

Jurisdiction	Agency	Telephone
Kansas City	Kansas City Health Department Air Quality Program	816-513-6314
St. Louis County	St. Louis County Health Department	314-615-8924

Two additional local agencies do not enforce Missouri's asbestos requirements but may have local ordinances concerning asbestos which they enforce:

Jurisdiction	Agency	Telephone
St. Louis (city)	St. Louis Division of Air Pollution Control Air Quality Program	314-613-7300
Springfield	Springfield-Greene County Health Department of Environmental Services	417-864-1412

Prior to performing a project in one of these jurisdictions, you should contact the appropriate agency to determine if any additional requirements apply.

Missouri Department of Natural Resources
Air Pollution Control Program
P.O. Box 176
Jefferson City, MO 65102
573-751-4817
573-751-2706 fax
<http://www.dnr.mo.gov/env/apcp/>

Other Department Offices

Regional Offices

Kansas City Regional Office
500 NE Colbern Road
Lee's Summit, MO 64086-4710
816-251-0700
816-622-7044 fax

Northeast Regional Office
1709 Prospect Dr.
Macon, MO 63552-2602
660-385-8000
660-385-8090 fax

St. Louis Regional Office
7545 S. Lindbergh, Suite 210
St. Louis, MO 63125
314-416-2960
314-416-2970 fax

Southeast Regional Office
2155 N. Westwood Blvd.

Poplar Bluff, MO 63901
573-840-9750
573-840-9754 fax

Southwest Regional Office
2040 W. Woodland
Springfield, MO 65807-5912
417-891-4300
417-891-4399 fax

Additional Asbestos Related Guidance Documents

For more specific information about the department's requirements in regard to asbestos, reference the additional guidance documents listed below or contact the department or appropriate local agency at the contact information found in this fact sheet.

These documents are available for free download from the department's website at www.dnr.mo.gov/pubs/index.html.

- [Asbestos: What is it and why is it a concern?, Fact Sheet--PUB2077](#)
- [How to Handle Asbestos-Containing Debris, Fact Sheet--PUB2121](#)
- [Management of Nonfriable Asbestos Containing Materials, Fact Sheet--PUB2156](#)
- [Requirements for Fire Training Exercises Involving Structures, Fact Sheet--PUB2029](#)

Nothing in this document may be used to implement any enforcement action or levy any penalty unless promulgated by rule under chapter 536 or authorized by statute.

For more information

Missouri Department of Natural Resources
Air Pollution Control Program
P.O. Box 176
Jefferson City, MO 65102-0176
573-751-4817 or 800-361-4827
<http://dnr.mo.gov/env/apcp/>

APPENDIX 2 – LEAD CONTAINING MATERIALS SURVEY & REPORT

November 1, 2022

Mr. Brian Connell
Connell Architecture, P.C.
2311 East Walnut, Suite B
Columbia, Missouri 65201

Subject: Ike Skelton – Military Education Facility, Jefferson City, Missouri - Paint Sample Results

Dear Mr. Connell:

On October 21, 2022, paint samples were collected from 2 locations inside the Ike Skelton – Military Education Facility. Samples were collected from grey paint on the interior walls on the 1st floor storage room and lobby area. MEC subcontracted with Schneider Laboratories in Richmond, Virginia to perform the paint analysis. The laboratory data results for the samples are attached and summarized below.

The U.S. EPA definition of lead-based paint is a lead concentration of 0.5% (5,000 mg/kg) or greater by weight. The lead concentrations of the samples were as follows:

Sample ID	Lead Concentration (%)	Exceeds 0.5% for Lead Based Paint?
Storage Room Grey Paint (L-1)	<0.009%	No
Lobby Grey Paint (L-3)	<0.012%	No

Please call me at in our Jefferson City Office at (573) 636-9454 or email me at rortbals@mecpc.com if you have any questions about this information.

Sincerely,

Midwest Environmental Consultants



Ryan Ortals, E.I.T.
Associate Engineer

2009 E. McCarty Street
Suite 2
Jefferson City, MO 65101
voice: 573.636.9454
fax: 573.761.4200

1350 E. Kingsley St.
Suite E
Springfield, MO 65804
voice: 417.886.9200
fax: 417.886.9876

www.mecpc.com



Customer: Midwest Environmental Consultants (3553)
Address: 2009 E McCarty Street, Ste. 2
Jefferson City, MO 65101

Order #: 492623

Matrix Paint
Received 10/20/22
Analyzed 10/25/22
Reported 10/25/22

Attn:
Project: Ike Skelton Elevator Asb/Lead
Location: Military Educational Building
Number:

PO Number:

Sample ID	Cust. Sample ID	Location Method	Sample Date	Weight		Conc.	RL*
				Total µg	% / Wt.		
492623-020	L-2	Paint	10/12/22	107 mg			
Lead		EPA 7000B		<10.0 µg	<0.00935 %	<93.5 mg/kg	93.5 mg/kg
<i>Sample weight below methods guidelines; results are accurate for weight provided.</i>							
492623-021	L-3	Paint	10/12/22	85.0 mg			
Lead		EPA 7000B		<10.0 µg	<0.0118 %	<118 mg/kg	118 mg/kg
<i>Sample weight below methods guidelines; results are accurate for weight provided.</i>							

Analyst: MY
492623-10/25/22 05:11 PM

Kelly Muncy

Reviewed By: **Kelly Muncy**
Manager

Federal Lead Paint Statute

Location	Level	Unit
Lead in paint by wt.	0.50	%
Lead in paint PPM	5000	mg/kg

Minimum reporting limit: 10.0 µg. All internal QC parameters were met. Unusual sample conditions, if any, are described. Do not reproduce this report except in full. Values are reported to three significant figures. PPM = mg/kg | PPB = µg/kg. The test results apply to the sample as received. AIHA-LAP, LLC accredited for Lead (Lab ID 100527).

APPENDIX 3 – ROOFING INSTALLER’S WARRANTY FORM

ROOFING INSTALLER’S WARRANTY

- A. **Whereas** <Name> of <Address> herein called the “Roofing Installer”, has performed roofing and associated work (“work”) on the following project:
1. **Owner:**
 2. **Address:**
 3. **Building Name / Type:**
 4. **Building Address:**
 5. **Area of Work:**
 6. **Acceptance Date:**
 7. **Warranty Period:**
 8. **Expiration Date:**
- B. **AND WHEREAS** Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period;
- C. **NOW THEREFORE** Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. Lightning;
 - b. Peak gust wind speed exceeding 72 mph;
 - c. Fire;
 - d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. Vapor condensation on bottom of roofing; and
 - g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
 2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof has been paid by Owner or by another responsible party so designated.
 3. The Roofing Installer is responsible for damage to work covered by this Warranty.
 4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void, unless Roofing Installer, before starting said work,

shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. The Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and examine evidence of such leaks, defects, or deterioration.
6. This Warranty is recognized to be the installation warranty of Roofing Installer on said work and shall not operate or restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents and to coordinate the Manufacturer's warranty, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <DAY> day of <MONTH>, 20 <YEAR>.

1. Authorized Signature:
2. Name:
3. Title:

END OF ROOFING INTALLER'S WARRANTY FORM