

PROJECT MANUAL

Elevator Replacement

Western Reception, Diagnostic and Correctional Center

St. Joseph, Missouri

Designed By: WSKF Architects
110 Armour Road
North Kansas City, MO 64116

Date Issued: January 11, 2023

Project No.: C2224-01

STATE *of* MISSOURI

OFFICE *of* ADMINISTRATION
Facilities Management, Design & Construction

DOCUMENT 000107 - SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:

1. John E Freshnock
2. MO # 2002021706



C. Plumbing Engineer:

1. Kevin J. Zimmerman
2. PE-2017029408

D. HVAC Engineer:

1. Kevin J. Zimmerman
2. PE-2017029408

E. Electrical Engineer:

1. Michael D. Raff.
2. PE-2005208097



Kevin J. Zimmerman - Engineer
MO# PE-2017029408

END OF DOCUMENT 000107



Michael D. Raaf - Engineer
MO# PE-2005028097

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SECTION 000115 – LIST OF DRAWINGS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

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

PART 2 - PRODUCTS (NOT APPLICABLE)**PART 3 - EXECUTION****3.1 LIST OF DRAWINGS**

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

	<u>TITLE</u>	<u>SHEET #</u>	<u>DATE</u>
1.	Cover	Sheet G1.00	1/11/23
2.	Dimension Plan	Sheet A1.01	1/11/23
3.	Building Sections and Elevations	Sheet A3.01	1/11/23
4.	Elevator Cab Plans	Sheet A4.01	1/11/23
5.	Mechanical/Electrical General Notes & Symbols	Sheet ME.00	1/11/23
6.	MEP – Schedules and Details	Sheet ME.01	1/11/23
7.	Mechanical/Plumbing – Floor Plans	Sheet M1.01	1/11/23
8.	Electrical – Demolition Floor Plan	Sheet E0.01	1/11/23
9.	Electrical – Floor Plan	Sheet E1.01	1/11/23

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. Elevator Replacement
Western Reception, Diagnostic and Correctional Center
St. Joseph, Missouri
Project No.: C2224-01

3.0 BIDS WILL BE RECEIVED:

- A. Until: 1:30 PM, Tuesday, April 18, 2023
- 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 replacement of equipment and cab finish improvements of one or two elevators in the Park Building at Western Reception, Diagnostic and Correctional Center. Western Reception, Diagnostic and Correctional Center is located at 3401 Faraon, St Joseph, MO 64506. The Park Building is a five-story building within WRDCC used for both housing and treatment. The Park Building has two elevators that appear to have been installed in the 1950s. At present, neither elevator in the Park Building is functional. The elevators exceeded their useful life and were no longer serviceable. The PE1 elevator has not been functional for approximately seven years and the PE2 elevator has not been functional for approximately three years. It is the Owner's objective to ensure the Park Building is accessible for the health and safety of prisoners, staff and emergency personnel at WRDCC by providing functional elevators.
- 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.**
- C. ****NOTE:** Bidders are provided new Good Faith Effort (GFE) forms on MissouriBUYS.

5.0 PRE-BID MEETING:

- A. Place/Time: 11:00 AM, Tuesday, April 4, 2023, at 3401 Faraon, St. Joseph, MO. Meet inside the Administration Building; a background check will be ran internally before site access.
- 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: WSKF Architects, John Freshnock, (816) 210-0453, email: jfreshnock@wskfarch.com
- B. Project Manager: Ryan Abbott, (573) 298-1967, email: Ryan.abbott@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."
- D. Any time a bidder wants to modify the bid, he or she will have to submit a new one. 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 Cathy Holliday at 573-751-3491 or by email: cathy.holliday@oa.mo.gov.

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://purch.oa.mo.gov/media/pdf/listing-certified-missouri-service-disabled-veteran-business-enterprises-sdves>

<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 Department of Corrections.

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: Elevator Replacement
Western Reception, Diagnostic and Correctional Center
St. Joseph,, Missouri

Project Number: C2224-01

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

ARTICLE 2. TIME OF COMPLETION

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

ARTICLE 3. LIQUIDATED DAMAGES

Whenever time is mentioned in this contract, time shall be and is of the essence of this contract. The Owner would suffer a loss should the Contractor fail to have the work embraced in this contract fully completed on or before the time above specified. THEREFORE, the parties hereto realize in order to adjust satisfactorily the damages on account of such failure that it might be impossible to compute accurately or estimate the amount of such loss or damages which the Owner would sustain by reason of failure to complete fully said work within the time required by this contract. The Contractor hereby covenants and agrees to pay the Owner, as and for **liquidated damages, the sum of \$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:	\$
Alternate No. 1:	\$
Alternate No. 2:	\$
Alternate No. 3:	\$
Alternate No. 4:	\$

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 sole proprietor partner officer or manager or managing member of

NAME

a sole proprietorship partnership
 limited liability company (LLC)

or 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

--

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 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	TOTAL AMOUNT OF SUBCONTRACT	\$ AMOUNT PAID-TO-DATE	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	\$	\$	
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Revised 05/21



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

PROJECT NUMBER

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

SIGNATURE

NOTARY INFORMATION

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

FILE: Closeout Documents

GENERAL CONDITIONS

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SECTION 007213 - GENERAL CONDITIONS

- A. These General Conditions apply to each section of these specifications. The Contractor is subject to the provisions contained herein.
- B. The General Conditions are intended to define the relationship of the Owner, the Designer and the Contractor thereby establishing certain rules and provisions governing the operation and performance of the work so that the work may be performed in a safe, orderly, expeditious and workmanlike manner.

ARTICLE 1 – GENERAL PROVISIONS

ARTICLE 1.1 - DEFINITIONS

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

- 1. **"COMMISSIONER"**: The Commissioner of the Office of Administration.
- 2. **"CONSTRUCTION DOCUMENTS"**: The "Construction Documents" shall consist of the Project Manual, Drawings and Addenda.
- 3. **"CONSTRUCTION REPRESENTATIVE:"** Whenever the term "Construction Representative" is used, it shall mean the Owner's Representative at the work site.
- 4. **"CONTRACTOR"**: Party or parties who have entered into a contract with the Owner to furnish work under these specifications and drawings.
- 5. **"DESIGNER"**: When the term "Designer" is used herein, it shall refer to the Architect, Engineer, or Consultant of Record specified and defined in Paragraph 2.0 of the Supplemental Conditions, or his duly authorized representative. The Designer may be either a consultant or state employee.
- 6. **"DIRECTOR"**: Whenever the term "Director" is used, it shall mean the Director of the Division of Facilities Management, Design and Construction or his Designee, representing the Office of Administration, State of Missouri. The Director is the agent of the Owner.
- 7. **"DIVISION"**: Shall mean the Division of Facilities Management, Design and Construction, State of Missouri.

- 8. **"INCIDENTAL JOB BURDENS"**: Shall mean those expenses relating to the cost of work, incurred either in the home office or on the job-site, which are necessary in the course of doing business but are incidental to the job. Such costs include office supplies and equipment, postage, courier services, telephone expenses including long distance, water and ice and other similar expenses.
- 9. **"JOINT VENTURE"**: An association of two (2) or more businesses to carry out a single business enterprise for profit for which purpose they combine their property, capital, efforts, skills and knowledge.
- 10. **"OWNER"**: Whenever the term "Owner" is used, it shall mean the State of Missouri.
- 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"**: Labor, material, supplies, plant and equipment required to perform and complete the service agreed to by the Contractor in a safe, expeditious, orderly and workmanlike manner so that the project shall be complete and finished in the best manner known to each respective trade.
- 15. **"WORKING DAYS"**: are all calendar days except Saturdays, Sundays and the following holidays: New Year's Day, Martin Luther King, Jr. Day, Lincoln Day, Washington's Birthday (observed), Truman Day, Memorial Day, Juneteenth, Independence Day, Labor Day, Columbus Day, Veterans Day (observed), Thanksgiving Day, Christmas Day.

ARTICLE 1.2 DRAWINGS AND SPECIFICATIONS

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

architectural drawings shall govern and, in case of conflict between structural and mechanical drawings, structural drawings shall govern.

- B. Specifications are separated into titled divisions for convenience of reference only and to facilitate letting of contracts and subcontracts. The Contractor is responsible for establishing the scope of work for subcontractors, which may cross titled divisions. Neither the Owner nor Designer will establish limits and jurisdiction of subcontracts.
- C. Figured dimensions take precedence over scaled measurements and details over smaller scale general drawings. In the event of conflict between any of the documents contained within the contract, the documents shall take precedence and be controlling in the following sequence: addenda, supplementary general conditions, general conditions, division 1 specifications, technical division specifications, drawings, bid form and instructions to bidders.
- D. Anything shown on drawings and not mentioned in these specifications or vice versa, as well as any incidental work which is obviously necessary to complete the project within the limits established by the drawings and specifications, although not shown on or described therein, shall be performed by the Contractor at no additional cost as a part of his contract.
- E. Upon encountering conditions differing materially from those indicated in the contract documents, the Contractor shall promptly notify the Designer and Construction Representative in writing before such conditions are disturbed. The Designer shall promptly investigate said conditions and report to the Owner, with a recommended course of action. If conditions do materially differ and cause an increase or decrease in contract cost or time required for completion of any portion of the work, a contract change will be initiated as outlined in Article 4 of these General Conditions.
- E. Only work included in the contract documents is authorized, and the Contractor shall do no work other than that described therein or in accordance with appropriately authorized and approved contract changes.

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

- A. Since the Owner is the State of Missouri, municipal or political subdivisions, zoning ordinances, construction codes (other than licensing of trades), and other like ordinances are not applicable to construction on Owner's property, and Contractor will not be required to submit drawings and specifications to any municipal or political subdivision, authority, obtain

construction permits or any other licenses (other than licensing of trades) or permits from or submit to inspections by any municipality or political subdivision relating to the construction for this project. All permits or licenses required by municipality or political subdivision for operation on property not belonging to Owner shall be obtained by and paid for by Contractor. Each Contractor shall comply with all applicable laws, ordinances, rules and regulations that pertain to the work of this contract.

- B. Contractors, subcontractors and their employees engaged in the businesses of electrical, mechanical, plumbing, carpentry, sprinkler system work, and other construction related trades shall be licensed to perform such work by the municipal or political subdivision where the project is located, if such licensure is required by local code. Local codes shall dictate the level (master, journeyman, and apprentice) and the number, type and ratio of licensed tradesmen required for this project within the jurisdiction of such municipal or political subdivision.
- C. Equipment and controls manufacturers and their authorized service and installation technicians that do not maintain an office within the jurisdiction of the municipal or political subdivision but are a listed or specified contractor or subcontractor on this project are exempt from Paragraph 1.3 B above.
- D. The Contractor shall post a copy of the wage determination issued for the project and included as a part of the contract documents, in a prominent and easily accessible location at the site of construction for the duration of the project.
- E. Any contractor or subcontractor to such contractor at any tier signing a contract to work on this project shall provide a ten-hour Occupational Safety and Health Administration (OSHA) construction safety program for their on-site employees which includes a course in construction safety and health approved by OSHA or a similar program approved by the Department of Labor and Industrial Relations which is at least as stringent as an approved OSHA program. The contractor shall forfeit as a penalty to the public body on whose behalf the contract is made or awarded, two thousand five hundred dollars plus one hundred dollars for each employee employed by the contractor or subcontractor, for each calendar day, or portion thereof, such employee is employed without the required training.

ARTICLE 1.4 - NONDISCRIMINATION IN EMPLOYMENT

- A. The Contractor and his subcontractors will not discriminate against individuals based on race,

color, religion, national origin, sex, disability, or age, but may use restrictions which relate to bona fide occupational qualifications. Specifically, the Contractor and his subcontractors shall not discriminate:

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

The Contractor and his Subcontractors will 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 negotiated, and may vary according to the nature, extent, and complexity of the work involved. However, the overhead and profit for the Contractor or subcontractor actually performing the work shall not exceed 14%. When one or more tiers of subcontractors are used, in no event shall any Contractor or subcontractor receive as overhead and profit more than 3% of the cost of the work performed by any of his subcontractors. In no case shall the total overhead and profit paid by the Owner on any Contract Changes exceed twenty percent (20%) 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 bonding and insurance to their cost of work. This 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 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 negotiated, and may vary according to the nature, extent and complexity of the work involved, but in no case shall be less than ten percent (10%). If the percentage for overhead and profit charged for work added by Contract Changes for this contract has been negotiated to less than 10%, the negotiated rate shall then apply to credits as well.
- 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:

John Freshnock
WSKF Architects
110 Armour Road
North Kansas City, MO 64116
Telephone: (816) 210-0453
Email: jfreshnock@wskfarch.com

Construction Representative:

Ricky Howard
Division of Facilities Management, Design and Construction
615 E 13th St.
Kansas City, MO 64106
Telephone: (816) 728-0385
Email: Ricky.Howard@oa.mo.gov

Project Manager:

Ryan Abbott
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, Missouri 65101
Telephone: (573) 298-1967
Email: Ryan.abbott@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 NOTICE: ALL BID MATERIALS ARE DUE AT THE TIME OF BID SUBMITTAL. THERE IS NO SECOND SUBMITTAL FOR THIS PROJECT.

4.0 FURNISHING CONSTRUCTION DOCUMENTS:

- A. The Owner will furnish the Contractor with approximately 4 complete sets of drawings and specifications at no charge.
- B. The Owner will furnish the Contractor with approximately 4 sets of explanatory or change drawings at no charge.
- C. The Contractor may make copies of the documents as needed with no additional cost to the Owner.

5.0 SAFETY REQUIREMENTS

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

Missouri

Division of Labor Standards

WAGE AND HOUR SECTION



MICHAEL L. PARSON, Governor

Annual Wage Order No. 29

Section 011
BUCHANAN 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, 2022**

Last Date Objections May Be Filed: **April 11, 2022**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	\$67.48
Boilermaker	\$28.90*
Bricklayer	\$56.91
Carpenter	\$54.67
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	\$28.90*
Plasterer	
Communications Technician	\$28.90*
Electrician (Inside Wireman)	\$53.90
Electrician Outside Lineman	\$28.90*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	\$28.90*
Glazier	\$28.90*
Ironworker	\$66.31
Laborer	\$43.28
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	\$54.10
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	\$28.90*
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	\$40.08
Plumber	\$65.60
Pipe Fitter	
Roofer	\$53.35
Sheet Metal Worker	\$68.44
Sprinkler Fitter	\$28.90*
Truck Driver	\$41.63
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 Section 290.210 RSMo.

Heavy Construction Rates for
BUCHANAN County

Section 011

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	\$62.33
Millwright	
Pile Driver	
Electrician (Outside Lineman)	\$28.90*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	\$45.77
General Laborer	
Skilled Laborer	
Operating Engineer	\$55.44
Group I	
Group II	
Group III	
Group IV	
Truck Driver	\$28.90*
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. 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 Section 290.210 RSMo.

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 replacement of equipment and cab finish improvements of one or two elevators in the Park Building at Western Reception, Diagnostic and Correctional Center. Western Reception, Diagnostic and Correctional Center is located at 3401 Faraon, St Joseph, MO 64506. The Park Building is a five-story building within WRDCC used for both housing and treatment. The Park Building has two elevators that appear to have been installed in the 1950s. At present, neither elevator in the Park Building is functional. The elevators exceeded their useful life and were no longer serviceable. The PE1 elevator has not been functional for approximately seven years and the PE2 elevator has not been functional for approximately three years. It is the Owner's objective to ensure the Park Building is accessible for the health and safety of prisoners, staff and emergency personnel at WRDCC by providing functional elevators.
- B. Project Location: 3401 Faraon, St Joseph, MO 64506
- C. Owner: State of Missouri, Office of Administration, Division of Facilities Management, Design and Construction, Harry S Truman State Office Building, Post Office Box 809, 301 West High Street, Jefferson City, Missouri 65102.
- D. Contract Documents, dated 1/11/23 were prepared for the Project by **WSKF Architects, 110 Armour Road, North Kansas City, MO 64116**
- E. The Work: consists of removal and replacement of elevator machine equipment, cables, controls, doors, call buttons and upgrades to existing cab finishes. Door will be replaced to roof from penthouse. New HAVC system will be added to elevator penthouse. Fire alarm system will be upgraded to include elevator operation.
- F. The Work will be constructed under a single prime contract.

1.3 CONTRACTOR USE OF PREMISES

- A. General: During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises limited only by the Owner's right to perform work or to retain other contractors on portions of the Project.
- B. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
 - 1. Owner Occupancy: Allow for Owner occupancy and use by the public.

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

1.4 OCCUPANCY REQUIREMENTS

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

1.5 MISCELLANEOUS PROVISIONS

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SCHEDULE OF PRODUCTS ORDERED IN ADVANCE

END OF SECTION 011000

SECTION 012100 – ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
 - 2. Weather allowances.
- C. Related Sections include the following:
 - 1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.
 - 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. The Contractor’s progress schedule shall clearly indicate the bad weather day allowance as an “activity” or “activities”. In the event weather conditions preclude performance of critical work activities for 50% or more of the Contractor’s scheduled workday, that day shall be declared unavailable for work due to weather (a “bad weather” day) and charged against the above allowance. Critical work activities will be determined by review of the Contractor’s current progress schedule.
- C. The Contractor’s Representative and the Construction Representative shall agree 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 Representatives. If there is a failure to agree on all or part of the “bad weather” days for a particular month, that disagreement shall be noted on this written document and signed by each party’s representative. Failure of the Contractor’s representative to sign the “bad weather” day documentation after it is presented, with or without the notes of disagreement, shall constitute agreement with the “bad weather” day determination contained in that document.
- D. There will be no modification to the time of contract performance due solely to the failure to deplete the “bad weather” day allowance.

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

1.4 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, Designer of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Designer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Designer from the designated supplier.

1.5 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

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

1.7 [LUMP-SUM] ALLOWANCES

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES

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

END OF SECTION 012100

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

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

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

1.4 PROCEDURES

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

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

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

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

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

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate 1: PE2 only
 - 1. Add stainless steel wall panels with stainless steel reveals, by Inpro or equal
 - 2. Add anti-ligature guardrail by Inpro or equal
 - 3. Add anti-ligature vented base cover by Inpro or equal
 - 4. Add anti-ligature stainless steel ceiling with new lighting and fan with access to ceiling hatch below existing cove at ceiling. By Inpro or equal
 - 5. Replace VCT flooring with new VCT
- B. Alternate 2: Add equipment removal to the PE1 decommissioning scope.
- C. Alternate 3: Add modernization and base bid car scope to PE1, as shown on sheets A3.01 & E1.01.
- D. Alternate 4: Add Alternate 1 scope to PE1 elevator, requires acceptance of alternate 3., as shown on sheet A3.01.

END OF SECTION 012300

SECTION 012600 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract Modifications.
- B. Related Sections include the following:
 - 1. Division 1, Section 013115 “Project Management Communications” for administrative requirements for communications.
 - 2. Division 0, Section 007213, Article 3.1 "Acceptable Substitutions" for administrative procedures for handling Requests for Substitutions made after Contract award.
 - 3. 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 Construction Representative of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration including requirements for the following:
 - a. Contract Documents
 - b. Options
 - c. Related RFIs
 - d. Related Change Orders
 - e. Purchases
 - f. Deliveries
 - g. Submittals
 - h. Review of mockups
 - i. Possible conflicts
 - j. Compatibility problems
 - k. Time schedules
 - l. Weather limitations
 - m. Manufacturer's written recommendations
 - n. Warranty requirements
 - o. Compatibility of materials

- p. Acceptability of substrates
 - q. Temporary facilities and controls
 - r. Space and access limitations
 - s. Regulations of authorities having jurisdiction
 - t. Testing and inspecting requirements
 - u. Installation procedures
 - v. Coordination with other Work
 - w. Required performance results
 - x. Protection of adjacent Work
 - y. Protection of construction and personnel
3. Contractor shall record significant conference discussions, agreements, and disagreements including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
 6. Revise paragraph below if Project requires holding progress meetings at different intervals. Insert special intervals such as "every third Tuesday" to suit special circumstances.
 7. Project name
 8. Name and address of Contractor
 9. Name and address of Designer
 10. RFI number including RFIs that were dropped and not submitted
 11. RFI description
 12. Date the RFI was submitted
 13. Date Designer's response was received
 14. Identification of related DSI or Proposal Request, as appropriate

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013115 - PROJECT MANAGEMENT COMMUNICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract including General and Supplementary Conditions, Bid Form, and other Division 1 Specification Sections apply to this Section.
- B. Division 1, Section 013300 - Submittals
- C. Division 1, Section 012600 – Contract Modification Procedures

1.2 SUMMARY

- A. Project Management Communications: The Contractor shall use the Internet web based project management communications tool, E-Builder[®] ASP software, and protocols included in that software during this project. The use of project management communications as herein described does not replace or change any contractual responsibilities of the participants.
 - 1. Project management communications is available through E-Builder[®] as provided by "e-Builder[®]" in the form and manner required by the Owner.
 - 2. The project communications database is on-line and fully functional. User registration, electronic and computer equipment, and Internet connections are the responsibility of each project participant. The sharing of user accounts is prohibited
- B. Support: E-Builder[®] will provide on-going support through on-line help files.
- C. Copyrights and Ownership: Nothing in this specification or the subsequent communications supersedes the parties' obligations and rights for copyright or document ownership as established by the Contract Documents. The use of CAD files, processes or design information distributed in this system is intended only for the project specified herein.
- D. Purpose: The intent of using E-Builder[®] is to improve project work efforts by promoting timely initial communications and responses. Secondly, to reduce the number of paper documents while providing improved record keeping by creation of electronic document files
- E. Authorized Users: Access to the web site will be by individuals who are authorized users.
 - 1. Individuals shall complete the E-Builder New Company/User Request Form located at the following web site: <https://oa.mo.gov/facilities/vendor-links/contractor-forms>.

Completed forms shall be emailed to the following email address: OA.FMDCE-BuilderSupport@oa.mo.gov.

2. Authorized users will be contacted directly and assigned a temporary user password.
 3. Individuals shall be responsible for the proper use of their passwords and access to data as agents of the company in which they are employed.
- F. Administrative Users: Administrative users have access and control of user licenses and all posted items. DO NOT POST PRIVATE OR YOUR COMPANY CONFIDENTIAL ITEMS IN THE DATABASE! Improper or abusive language toward any party or repeated posting of items intended to deceive or disrupt the work of the project will not be tolerated and will result in deletion of the offensive items and revocation of user license at the sole discretion of the Administrative User(s).
- G. Communications: The use of fax, email and courier communication for this project is discouraged in favor of using E-Builder® to send messages. Communication functions are as follows:
1. Document Integrity and Revisions:
 - a. Documents, comments, drawings and other records posted to the system shall remain for the project record. The authorship time and date shall be recorded for each document submitted to the system. Submitting a new document or record with a unique ID, authorship, and time stamp shall be the method used to make modifications or corrections.
 - b. The system shall make it easy to identify revised or superseded documents and their predecessors.
 - c. Server or Client side software enhancements during the life of the project shall not alter or restrict the content of data published by the system. System upgrades shall not affect access to older documents or software.
 2. Document Security:
 - a. The system shall provide a method for communication of documents. Documents shall allow security group assignment to respect the contractual 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 users normal work location¹ with high-speed Internet access, i.e. DSL, local cable company's Internet connection, or T1 connection.
2. Each of the above referenced computer systems shall have the following minimum system² and software requirements:
 - a. Desktop configuration (Laptop configurations are similar and should be equal to or exceed desktop system.)
 - 1) Operating System: Windows XP or newer
 - 2) Internet Browser: Internet Explorer 6.01SP2+ (Recommend IE7.0+)
 - 3) Minimum Recommend Connection Speed: 256K or above
 - 4) Processor Speed: 1 Gigahertz and above
 - 5) RAM: 512 mb
 - 6) Operating system and software shall be properly licensed.
 - 7) Internet Explorer version 7 (current version is a free distribution for download). This specification is not intended to restrict the host server or client computers provided that industry standard HTTP clients may access the published content.
 - 8) Adobe Acrobat Reader (current version is a free distribution for download).
 - 9) Users should have the standard Microsoft Office Suite (current version must be purchased) or the equivalent.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable.)

END OF SECTION 013115

¹ The normal work location is the place where the user is assigned for more than one-half of his time working on this project.

² The minimum system herein will not be sufficient for many tasks and may not be able to process all documents and files stored in the E-Builder® Documents area.

SECTION 013200 – SCHEDULE – BAR CHART

PART 1 - GENERAL

1.1 RELATED DOCUMENTS 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
013200	Schedules	Construction Schedule
013200	Schedules	Schedule of Values
013200	Schedules	List of Subcontractors
013200	Schedules	Major Material Suppliers
055000.01	METAL FABRICATION	Shop Drawings
055000.02	METAL FABRICATION	Delegated Design Submittal
055000.03	METAL FABRICATION	Certification
055000.04	METAL FABRICATION	Test Report
055000.05	METAL FABRICATION	Qualifications

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074213.01	INSULATED METAL WALL PANELS	Product Data
074213.02	INSULATED METAL WALL PANELS	Shop Drawings
074213.03	INSULATED METAL WALL PANELS	Sample
074213.04	INSULATED METAL WALL PANELS	Warranty
074213.05	INSULATED METAL WALL PANELS	Operation / Maintenance Manual
074213.06	INSULATED METAL WALL PANELS	Qualifications
081113.01	HOLLOW METAL DOORS AND FRAMES	Shop Drawings
081113.02	HOLLOW METAL DOORS AND FRAMES	Sample
081113.03	HOLLOW METAL DOORS AND FRAMES	Schedule
087111.01	DOOR HARDWARE	Product Data
087111.02	DOOR HARDWARE	Schedule
087111.03	DOOR HARDWARE	Test Report
087111.04	DOOR HARDWARE	Operation / Maintenance Manual
096519.01	RESILIENT TILE FLOORING	Product Data
096519.02	RESILIENT TILE FLOORING	Sample
096519.03	RESILIENT TILE FLOORING	Qualifications
096519.04	RESILIENT TILE FLOORING	Operation / Maintenance Manual
099113.01	EXTERIOR PAINTING	Product Data
099113.02	EXTERIOR PAINTING	Sample
099113.03	EXTERIOR PAINTING	Schedule
099123.01	INTERIOR PAINTING	Product Data
099123.02	INTERIOR PAINTING	Sample
099123.03	INTERIOR PAINTING	Schedule
142100.01	ELECTRIC TRACTION ELEVATORS	Shop Drawings
142100.02	ELECTRIC TRACTION ELEVATORS	Product Data
142100.03	ELECTRIC TRACTION ELEVATORS	Sample
142100.04	ELECTRIC TRACTION ELEVATORS	Field Measurements
142100.05	ELECTRIC TRACTION ELEVATORS	Operation / Maintenance Manual
142100.06	ELECTRIC TRACTION ELEVATORS	As-Builts
220505.01	PLUMBING DEMOLITION	Schedule
220505.02	PLUMBING DEMOLITION	Field Measurements

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220514.01	MOTOR CONTROL & EQUIP. DISCONNECTS	Product Data
220514.02	MOTOR CONTROL & EQUIP. DISCONNECTS	Shop Drawings
221000.01	PLUMBING PIPING	Product Data
221429.01	SUMP PUMPS	Product Data
221429.02	SUMP PUMPS	Shop Drawings
221429.03	SUMP PUMPS	Operation / Maintenance Manual
230011.01	BASIC MECHANICAL MATERIALS	Test Report
230505.01	MECHANICAL DEMOLITION	Schedule
230505.02	MECHANICAL DEMOLITION	Field Measurements
230514.01	PIPING INSULATION	Product Data
230514.02	PIPING INSULATION	Shop Drawings
230553.01	ID FOR PIPING AND EQUIPMENT	Product Data
230719.01	PIPING INSULATION	Product Data
230719.02	PIPING INSULATION	Shop Drawings
230719.03	PIPING INSULATION	Qualifications
230719.04	PIPING INSULATION	Test Report
232000.01	HVAC PIPING	Product Data
238116.01	MINI-SPLIT SYSTEMS	Product Data
238116.02	MINI-SPLIT SYSTEMS	Shop Drawings
238116.03	MINI-SPLIT SYSTEMS	Test Report
238116.04	MINI-SPLIT SYSTEMS	Operation / Maintenance Manual
260505.01	ELECTRICAL DEMOLITION	Schedule
260505.02	ELECTRICAL DEMOLITION	Field Measurements
260519.01	WIRE AND CABLE	Product Data
260519.02	WIRE AND CABLE	Qualifications
260519.03	WIRE AND CABLE	Test Report
260526.01	GROUNDING	Product Data
260526.02	GROUNDING	Test Report

260923.01	LIGHTING CONTROL DEVICES	Product Data
260923.02	LIGHTING CONTROL DEVICES	Test Report
260923.03	LIGHTING CONTROL DEVICES	Operation / Maintenance Manual
262416.01	ENCLOSED CONTROLLERS	Product Data
262416.02	ENCLOSED CONTROLLERS	Shop Drawings
262416.03	ENCLOSED CONTROLLERS	Certification
262416.04	ENCLOSED CONTROLLERS	Operation / Maintenance Manual
262726.01	WIRING DEVICES	Product Data
262726.02	WIRING DEVICES	Shop Drawings
262726.03	WIRING DEVICES	Operation / Maintenance Manual
262813.01	FUSES	Product Data
262813.02	FUSES	Operation / Maintenance Manual
262913.01	ENCLOSED CONTROLLERS	Product Data
262913.02	ENCLOSED CONTROLLERS	Shop Drawings
262913.03	ENCLOSED CONTROLLERS	Certification
262913.04	ENCLOSED CONTROLLERS	Operation / Maintenance Manual
264300.01	SURGE PROTECTION	Product Data
264300.02	SURGE PROTECTION	Test Report
264300.03	SURGE PROTECTION	As-Builts
265000.01	LIGHTING	Product Data
265000.02	LIGHTING	Shop Drawings
265000.03	LIGHTING	Test Report
280500.01	FIRE ALARM	Product Data
280500.02	FIRE ALARM	Shop Drawings
280500.03	FIRE ALARM	Qualifications
280500.04	FIRE ALARM	Test Report
280500.05	FIRE ALARM	Operation / Maintenance Manual
280500.06	FIRE ALARM	As-Builts

END OF SECTION 013300

SECTION 013513.16 – SITE SECURITY AND HEALTH REQUIREMENTS (DOC)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUBMITTALS

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

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 ACCESS TO THE SITE

- A. The Contractor shall arrange with Facility Representatives to establish procedures for the controlled entry of workers and materials into the work areas at the Facility.
- B. The Contractor shall establish regular working hours with Facility Representatives. The Contractor must report changes in working hours or overtime to Facility Representatives and obtain approval twenty-four (24) hours ahead of time. The Contractor shall report emergency overtime to Facility Representatives as soon as it is evident that overtime is needed. The Contractor must obtain approval from Facility Representatives for all work performed after dark.
- C. The Contractor shall provide the name and phone number of the Contractor's employee or agent who is in charge onsite; this individual must be able to be contacted in case of emergency. The Contractor must be able to furnish names and address of all employees upon request.
- D. The Contractor shall provide Facility Representatives notice twenty-four (24) hours prior to any possible vehicle entry and/or required escort. The Contractor shall maintain a time log of any delays in gaining entrance to the Facility due to lack of an escort, which is to be submitted monthly with the Contractor's pay request materials. The purpose of this log is to establish a basis for a contract change, if required. The log shall contain the date and time of delay, date and time of request of entry, workers delayed (name and occupation), and name of the Facility Representative to whom the request was made, if possible. Any delay in entry must be validated by sallyport and pass office personnel at the Facility. Only delays greater than thirty (30) minutes will be

considered for a contract change. A 30-minute delay upon arrival with a vehicle to enter the sallyport should be expected.

3.2 RULES OF THE FACILITY

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

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

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

3.3 SECURITY CLEARANCES AND RESTRICTIONS

A. DOC SECURITY CLEARANCE REQUIREMENTS

1. Prior to the commencement of any onsite work, the Contractor shall submit a list containing the name, date of birth, and Missouri driver's license number or social security number of all construction personnel to the Missouri Department of Corrections for the purpose of obtaining security clearances. The required information shall be submitted at the pre-construction meeting, or as otherwise directed by Department of Corrections' personnel. Any construction personnel with pending warrants or felony convictions within the last five (5) years or other offenses deemed to create a security risk by Department of Corrections shall not be allowed onsite. The Department of Corrections reserves the right to refuse admission to any individual they feel may be detrimental to the security of the Facility.

3.4 FIRE PROTECTION, SAFETY, AND HEALTH CONTROLS

- A. The Contractor shall take all necessary precautions to guard against and eliminate possible fire hazards.
 - 1. Onsite burning is prohibited.
 - 2. The Contractor shall store all flammable or hazardous materials in proper containers located outside the buildings or offsite, if possible.
 - 3. The Contractor shall provide and maintain, in good order, during construction fire extinguishers as required by the National Fire Protection Association. In areas of flammable liquids, asphalt, or electrical hazards, 15-pound carbon dioxide or 20-pound dry chemical extinguishers shall be provided.
- B. The Contractor shall not obstruct streets or walks without permission from the Owner's Construction Representative and Facility Representatives.
- C. The Contractor's personnel shall not exceed the speed limit of 15 mph while at the Facility unless otherwise posted.
- D. The Contractor shall take all necessary, reasonable measures to reduce air and water pollution by any material or equipment used during construction. The Contractor shall keep volatile wastes in covered containers, and shall not dispose of volatile wastes or oils in storm or sanitary drains.
- E. The Contractor shall keep the project site neat, orderly, and in a safe condition at all times. The Contractor shall immediately remove all hazardous waste, and shall not allow rubbish to accumulate. The Contractor shall provide onsite containers for collection of rubbish and shall dispose of it at frequent intervals during the progress of the Work.
- F. Fire exits, alarm systems, and sprinkler systems shall remain fully operational at all times, unless written approval is received from the Owner's Construction Representative and the appropriate Facility Representative at least twenty-four (24) hours in advance. The Contractor shall submit a written time schedule for any proposed shutdowns.
- G. For all hazardous materials brought onsite, Material Safety Data Sheets shall be on site and readily available upon request at least a day before delivery.
- H. The Contractor's workers shall not be under the influence of any intoxicating substances while on the Facility premises.

3.5 TUBERCULOSIS TESTING REQUIREMENTS

- A. All workers who will be in the confines of the Facility for more than ten (10) consecutive working days must provide proof of a negative tuberculin skin test. The test results must be no more than six (6) months old at the commencement of construction. The Contractor or the worker, not the Owner, shall pay the cost of the test.
- B. The Contractor shall submit to Facility Representatives current tuberculin skin test results for all workers who are required to have such a test in accordance with paragraph A above. If the contract period extends for more than twelve (12) months, the Contractor must provide new test results for all workers prior to the anniversary of the contract commencement date.

- C. Any worker required to have a tuberculin skin test under paragraph A above who fails or refuses to do so will be denied admission to the facility until such time as proof of the test results are provided.
- D. If any worker has a tuberculin skin test with positive results, the worker shall be denied access to the facility until the worker produces a certification from a physician licensed to practice in the State of Missouri that the worker does not have infectious tuberculosis.
- E. The Contractor shall not be entitled to any additional time or compensation if any of its workers are denied access to the facility because of failure to produce negative tuberculin skin test results.
- F. Failure or refusal of the Contractor to maintain and produce the required tuberculin skin test records shall be a material breach of this contract, which shall subject the Contractor to a declaration of default.

3.6 PREA FOR CONTRACTORS AND EMPLOYEES

- A. The contractor and all of the contractor's employees and agents providing services in any Department of Corrections institution must be at least 18 years of age. A Missouri Uniform Law Enforcement System (MULES) check or other background investigation may be required on the contractor, the contractor's employees and agents before they are allowed entry into the institution. The contractor, its employees and agents understand and agree that the Department may complete criminal background records checks annually for the contractor and the contractor's employees and agents that have the potential to have contact with inmates.
- B. The institution shall have the right to deny access into the institution for the contractor and any of the contractor's employees and agents for any reason, at the discretion of the institution.
- C. The contractor, its employees and agents under active federal or state felony or misdemeanor supervision must receive written division director approval prior to providing services pursuant to a Department contract. Similarly, contractors/employees/agents with prior felony convictions and not under active supervision must receive written division director approval in advance.
- D. The contractor, its employees and agents shall at all times observe and comply with all applicable state statutes, Department rules, regulations, guidelines, internal management policies and procedures, and general orders of the Department that are applicable, regarding operations and activities in and about all Department property. Furthermore, the contractor, its employees and agents, shall not obstruct the Department or any of its designated officials from performing their duties in response to court orders or in the maintenance of a secure and safe correctional environment. The contractor shall comply with the Department's policies and procedures relating to employee conduct.
 - 1. The Department has a zero tolerance policy for any form of sexual misconduct to include staff/contractor/volunteer on offender, or offender on offender, sexual harassment, sexual assault, sexual abuse and consensual sex.
 - a) Any contractor or contractor's employee or agent who witnesses any form of sexual misconduct must immediately report it to the warden of the institution. If a contractor or contractor's employee or agent fails to report or knowingly condones sexual harassment or sexual contact with or between offenders, the Department may cancel the contract, or at the Department's sole discretion,

require the contractor to remove the employee/agent from providing services under the contract.

- b) Any contractor or contractor's employee or agent who engages in sexual abuse shall be prohibited from entering the institution and shall be reported to law enforcement agencies and licensing bodies, as appropriate.
- E. The contractor, its employees and agents shall not interact with the offenders except as is necessary to perform the requirements of the contract. The contractor, its employees and agents shall not give anything to nor accept anything from the offenders except in the normal performance of the contract.
- F. If any contractor or contractor's employee or agent is denied access into the institution for any reason or is denied approval to provide service to the Department for any reason stated herein, it shall not relieve the contractor of any requirements of the contract. If the contractor is unable to perform the requirements of the contract for any reason, the contractor shall be considered in breach.

3.7 DISRUPTION OF UTILITIES

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

3.8 CELL PHONES AND ELECTRONIC DEVICES

- A. Cell phones, pagers, smart watches (that can send/receive messages), fitness wrist bands (that can send/receive messages) or other electronic devices are not permitted.
 - 1. Contractors, repairpersons, or information technology services department staff may be permitted to bring in a cell phone and portable wireless router (Wi-Fi, MiFi, etc.) if approved by the Chief Administrative Officer (CAO) when the phone is necessary to complete job duties relating to repairs on a case by case basis.
 - 2. Tablets (IPad, etc.) are not allowed with the exception of for re-entry purposes and approved via the division of adult institutions (DAI) director and the re-entry manager.
 - 3. Lap top computers may be permitted by the CAO on a case by case basis.

END OF SECTION 013513.16

SECTION 015000 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes requirements for construction facilities and temporary controls including temporary utilities, support facilities, security, and protection.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Water service and distribution- by owner.
 - 2. Temporary electric power and light- by owner
 - 3. Temporary heat- by owner
 - 4. Ventilation- by owner
 - 5. Telephone service- not provided
 - 6. Sanitary facilities, including drinking water- by owner
 - 7. Storm and sanitary sewer- by owner
- C. Support facilities include, but are not limited to, the following:
 - 1. Field offices - by owner
 - 2. Storage sheds- by contractor if needed,
 - 3. Temporary roads and paving- by owner
 - 4. Dewatering facilities and drains- by owner
 - 5. Temporary enclosures- by contractor
 - 6. Hoists and temporary elevator use – by contractor, existing elevators not functioning
 - 7. Temporary project identification signs and bulletin boards- by contractor
 - 8. Waste disposal services- by contractor
 - 9. Rodent and pest control – by owner
 - 10. Construction aids and miscellaneous services and facilities – by contractor
- D. Security and protection facilities include, but are not limited to, to following:
 - 1. Temporary fire protection- by contractor
 - 2. Barricades, warning signs, and lights- by contractor
 - 3. Sidewalk enclosure fence for the site – by contractor

4. Environmental protection – by contractor

1.3 SUBMITTALS

- A. Temporary Utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.
- B. Implementation and Termination Schedule: Within (15) days of the date established for commencement of the Work, submit a schedule indicating implementation and termination of each temporary utility.

1.4 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations including, but not limited to, the following:
 1. Building code requirements
 2. Health and safety regulations
 3. Utility company regulations
 4. Police, fire department, and rescue squad rules
 5. Environmental protection regulations
- B. Standards: Comply with NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations”. ANSI A10 Series standards for “Safety Requirements for Construction and Demolition”, and NECA Electrical Design Library “Temporary Electrical Facilities”.
 1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 “National Electric Code”.
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

- A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.
- B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist onsite.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide new materials. If acceptable to the Designer, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.
- B. Lumber and Plywood: Comply with requirements in Division 6 Section “Rough Carpentry”.
 - 1. For job-built temporary office, shops, and sheds within the construction area, provide UL-labeled, fire-treated lumber and plywood for framing, sheathing, and siding.
 - 2. For signs and directory boards, provide exterior-type, Grade B-B high-density concrete form overlay plywood of sized and thicknesses indicated.
 - 3. For fences and vision barriers, provide minimum 3/9” (9.5mm) thick exterior plywood.
 - 4. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8” (16mm) thick exterior plywood.
- C. Gypsum Wallboard: Provide gypsum wallboard on interior walls of temporary offices.
- D. Roofing Materials: Provide UL Class A standard-weight asphalt shingles or UL Class C mineral-surfaced roll roofing on roofs of job-built temporary office, shops, and shed.
- E. Paint: Comply with requirements of Division 9 Section “Painting”.
 - 1. For job-built temporary offices, shops, sheds, fences, and other exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.
 - 2. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.
 - 3. For interior walls of temporary offices, provide two (2) quarts interior latex-flat wall paint.
- F. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of (15) or less. For temporary enclosures, provide translucent, nylon-reinforced laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
- G. Water: Provide potable water approved by local health authorities.
- H. Open-Mesh Fencing: Provide 0.120” (3mm) thick, galvanized 2” (50mm) chainlink fabric fencing 6’ (2m) high with galvanized steel pipe posts, 1½” (38mm) ID for line posts and 2½” (64mm) ID for corner posts.

2.2 EQUIPMENT

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

- B. Water Hoses: Provide ¾" (19mm), heavy-duty, abrasion-resistant, flexible rubber hoses 100' (30m) long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
- C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110 to 120V plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
- D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage rating.
- E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixture where exposed to moisture.
- F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
- G. Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.
- H. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated re-circulation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- I. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers, or a combination of extinguishers of NFPA-recommended classes for the exposures.
 - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each Facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. Temporary Water Service: The Owner will provide water for construction purposes from the existing building system. All required temporary extensions shall be provided and removed by the Contractor. Connection points and methods of connection shall be designated and approved by the Construction Representative.
- B. Temporary Electric Power Service: The Owner will provide electric power for construction lighting and power tools. Contractors using such services shall pay all costs of temporary services, circuits, outlet, extensions, etc.
- C. Temporary Lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching.
 - 1. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.
- D. Temporary Heating: Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
 - 1. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP gas or fuel-oil heaters with individual space thermostatic control.
 - 2. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.
- E. Temporary 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.
- F. Temporary Telephones: The Owner will provide telephones within the facility. All construction personnel will be allowed access only to those specific telephones designated by the Construction Representative.
- G. Temporary Toilets: Use of the Owner's existing toilet facilities will be permitted, so long as facilities are cleaned and maintained in a condition acceptable to the Owner. All construction personnel will be allowed access only to those specific facilities designed by the Construction Representative. At substantial completion, restore these facilities to the condition prevalent at the time of initial use.
- H. Wash Facilities: The Owner will provide wash facilities within the building. All construction personnel will be allowed access only to those specific facilities designated by the Construction Representative.

- I. Drinking-Water Facilities: The Owner will provide drinking water facilities within the building. All construction personnel will be allowed access only to those specific facilities designated by the Construction Representative.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Locate field offices, storage sheds, and other temporary construction and support facilities for easy access.
1. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.
- B. Field Offices: Owner will provide temporary offices of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings. Furnish and equip office as follows:
1. Furnish with a desk and chairs, a 4-drawer file cabinet, plan table, plan rack, and a 6-shelf bookcase.
 2. Equip with a water cooler and private toilet complete with water closet, lavatory, and medicine cabinet unit with a mirror.
- C. Storage Facilities: The Owner will provide storage onsite as designated by the Facility Representative or the Construction Representative. Areas for use by the Contractor for storage will be identified at the Pre-Bid Meeting.
- D. Construction Parking: Contractors must be prepared to discuss their storage and parking needs at the Pre-Bid Meeting. Parking for construction personnel cannot be provided onsite. All parking will be offsite. The Contractor will have to park on the street, in city-owned lots, or in commercial lots. Under no circumstances will any vehicle be parked in a fire lane. Parking on lawns shall be prohibited.
- E. 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.

- F. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered “tools and equipment” and not temporary facilities.
- G. 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.
- H. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than seven (7) days during normal weather or three (3) days when the temperature is expected to rise above 80°F (27°C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.
- I. Rodent Pest Control: Before deep foundation work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Employ this service to perform extermination and control procedures are regular intervals so the Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- J. Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished, permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Designer.
- B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonable predictable and controllable fire losses. Comply with NFPA 10 “Standard for Portable Fire Extinguishers” and NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations”.
 - 1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one (1) extinguisher on each floor at or near each usable stairwell.
 - 2. Store combustible materials in containers in fire-safe locations.
 - 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.

4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
- C. Permanent Fire Protection: At the earliest feasible date in each area of the Project complete installation of the permanent fire-protection facility including connected services and place into operation and use. Instruct key personnel on use of facilities.
 - D. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting including flashing red or amber lights.
 - E. Enclosure Fence: Before excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated, or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.
 1. Provide open-mesh, chainlink fencing with posts set in a compacted mixture of gravel and earth.
 2. Provide plywood fence, 8' (2.5m) high, framed with (4) 2"x4" (50mm x 100mm) rails, and preservative-treated wood posts spaced not more than 8' (2.5m) apart.
 - F. Covered Walkway: Erect a structurally adequate, protective covered walkway for passage of persons along the adjacent public street. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.
 1. Construct covered walkways using scaffold or shoring framing. Provide wood plank overhead decking, protective plywood enclosure walls, handrails, barricades, warning signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage. Extend the back wall beyond the structure to complete the enclosure fence. Paint and maintain in a manner acceptable to the Owner and the Designer.
 - G. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
 1. Storage: Where materials and equipment must be stored and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
 - H. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.5 OPERATION, TERMINATION AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
 - 2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Termination and Removal: Unless the Designer requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.
 - 2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances as required by the governing authority.
 - 3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:
 - a. Replace air filters and clean inside of ductwork and housing.
 - b. Replace significantly worn parts and parts subject to unusual operating conditions.
 - c. Replace lamps burned out or noticeably dimmed by hours of use.

END OF SECTION 015000

SECTION 017400 – CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

- A. General
 - 1. Retain all stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials.
 - 2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
 - 3. At least <once><twice> each month, and more often if necessary, completely remove all scrap, debris, and waste material from the jobsite.
 - 4. Provide adequate storage for all items awaiting removal from the jobsite, observing all requirements for fire protection and protection of the ecology.
- B. Site

1. Daily, inspect the site and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.
2. Weekly, inspect all arrangements of materials stored onsite. Re-stack, tidy, or otherwise service all material arrangements.
3. Maintain the site in a neat and orderly condition at all times.

C. Structures

1. Daily, inspect the structures and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.
2. Weekly, sweep all interior spaces clean. “Clean” for the purposes of this paragraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and handheld broom.
3. In preparation for installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using all equipment and materials required to achieve the required cleanliness.
4. Following the installation of finish floor materials, clean the finish floor daily while work is being performed in the space in which finish materials have been installed. “Clean” for the purposes of this subparagraph, shall be interpreted as meaning free from all foreign material which, in the opinion of the Construction Representative, may be injurious to the finish of the finish floor material.

3.2 FINAL CLEANING

- A. General: Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer’s instructions.
- B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for the entire Project or a portion of the Project.
 1. Clean the Project Site, yard and grounds, in areas disturbed by construction activities including landscape development areas, of rubbish, waste material, litter, and foreign substances.
 2. Sweep paved areas broom clean. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 3. Remove petrochemical spills, stains, and other foreign deposits.
 4. Remove tools, construction equipment, machinery, and surplus material from the site.
 5. Remove snow and ice to provide safe access to the building.
 6. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

7. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 8. Broom clean concrete floors in unoccupied spaces.
 9. Vacuum clean carpet and similar soft surfaces removing debris and excess nap. Shampoo, if required.
 10. Clean transparent material, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 11. Remove labels that are not permanent labels.
 12. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - a. Do not paint over “UL” and similar labels, including mechanical and electrical nameplates.
 13. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 14. Clean plumbing fixtures to a sanitary condition free of stains, including stains resulting from water exposure.
 15. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 16. Clean ducts, blowers, and coils if units were operated without filters during construction
 17. Clean food-service equipment to a sanitary condition, ready and acceptable for its intended use.
 18. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs and defective and noisy starters in fluorescent and mercury vapor fixtures.
 19. Leave the Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests. Comply with regulations of local authorities.
- D. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of the construction period.
- E. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of lawfully.
1. Where extra materials of value remain after Final Acceptance by the Owner, they become the Owner’s property.

END OF SECTION 017400

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
- B. Attendance Record: For each training module, submit list of participants and length of instruction time.
- C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
 - 1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project.
 - b. Name and address of videographer.
 - c. Name of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Date of video recording.
 - 2. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.

3. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

1.5 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative experienced in operation and maintenance procedures and training.
- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Coordination". Review methods and procedures related to demonstration and training including, but not limited to, the following:
 1. Inspect and discuss locations and other facilities required for instruction.
 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 3. Review required content of instruction.
 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

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

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

- a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
2. Documentation: Review the following items in detail:
- a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
- a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 007213 "General Conditions".
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
 2. Owner will furnish an instructor to describe Owner's operational philosophy.
 3. Owner will furnish Contractor with names and positions of participants.
- B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 1. Schedule training with Owner with at least seven days' advance notice.

- C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- D. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner, on electronic media.
 - 1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
 - 2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
 - 3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
 - 4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
 - a. Name of Contractor/Installer.
 - b. Business address.
 - c. Business phone number.
 - d. Point of contact.
 - e. E-mail address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
 - 1. Film training session(s) in segments not to exceed 15 minutes.
 - a. Produce segments to present a single significant piece of equipment per segment.
 - b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
 - c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.
- F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
- G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 017900

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

B. Related Requirements:

1. Section 010100 "Summary of the Work" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

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

1.4 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.5 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.
- D. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.6 CLOSEOUT SUBMITTALS

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

1.7 QUALITY ASSURANCE

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. 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. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. 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.

1.8 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:
 - 1. Roofing
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.9 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

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/ASSP 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. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
 - 1. Inventory and record the condition of items to be removed and salvaged.
 - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

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.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, 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.
1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

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. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. 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. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. 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 portable fire-suppression devices during flame-cutting operations.
 5. Maintain fire watch during and for at least 48 hours after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly.
- B. 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.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area on-site.
 5. Protect items from damage during transport and storage.
- D. 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.
- E. 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 cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
- B. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Section for new roofing requirements.
1. Remove existing roof membrane, flashings, copings, and roof accessories.
 2. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
1. Do not allow demolished materials to accumulate on-site.

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.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

3.7 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.

3.8 SELECTIVE DEMOLITION SCHEDULE

- A. See drawings for items to be removed

END OF SECTION 024119

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous framing and supports.
2. Metal ladders.
3. Alternating tread devices.
4. Miscellaneous steel trim.
5. Loose bearing and leveling plates.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
3. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

C. Related Requirements:

1.2 COORDINATION

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

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Fasteners.
2. Shop primers.
3. Shrinkage-resisting grout.
4. Slotted channel framing.

- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Miscellaneous framing and supports for applications where framing and supports are not specified in other Sections.
 2. Elevator machine beams, hoist beams, and divider beams.
 3. Steel shapes for supporting elevator door sills.
 4. Metal ladders.
 5. Metal floor plate and supports.
- C. Delegated Design Submittals: For ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Certificates:
1. Welding certificates.
 2. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- B. Research Reports: For post-installed anchors.
- C. Delegated design engineer qualifications.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.6 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.
- B. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
- C. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- D. Zinc-Coated Steel Wire Rope: ASTM A741.

1. Wire Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
- E. Stainless Steel Wire Rope: Wire rope manufactured from stainless steel wire complying with ASTM A492, Type 316.
1. Wire Rope Fittings: Stainless steel connectors, Type 316, with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
- F. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
- G. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.
- H. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.
- I. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
- J. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.
- K. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.
- L. Bronze Extrusions: ASTM B455, Alloy UNS No. C38500 (extruded architectural bronze).
- M. Bronze Castings: ASTM B584, Alloy UNS No. C83600 (leaded red brass) or UNS No. C84400 (leaded semired brass).
- N. Nickel Silver Extrusions: ASTM B151/B151M, Alloy UNS No. C74500.
- O. Nickel Silver Castings: ASTM B584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.2 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
1. Provide stainless steel fasteners for fastening aluminum stainless steel or nickel silver.
 2. Provide bronze fasteners for fastening bronze.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 3, heavy-hex steel structural bolts; ASTM A563, Grade DH3, heavy-hex carbon-steel nuts; and where indicated, flat washers.

- D. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy [Group 1] [Group 2].
- E. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- F. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.
- G. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.
- H. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.3 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting." Section 099123 "Interior Painting."
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.
- D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- F. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

- H. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- I. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi.

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing[**and contour of welded surface matches that of adjacent surface**].
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.

2.6 METAL LADDERS

- A. General:
 - 1. For elevator pit ladders, comply with ASME A17.1/CSA B44.
- B. Steel Ladders:
 - 1. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
 - 2. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
 - 3. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
 - 4. Prime ladders, including brackets and fasteners, with zinc-rich primer.

2.8 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim.

2.9 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.10 GENERAL FINISH REQUIREMENTS

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

2.11 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with universal shop primer unless zinc-rich primer is indicated.
- D. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
1. Cast Aluminum: Heavy coat of bituminous paint.
 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF METAL LADDERS

- A. Secure ladders to adjacent construction with the clip angles attached to the stringer.
- B. Install brackets as required for securing of ladders welded or bolted to structural steel or built into masonry or concrete.

3.4 INSTALLATION OF MISCELLANEOUS STEEL TRIM

- A. Anchor to concrete construction to comply with manufacturer's written instructions.

3.5 INSTALLATION OF LOOSE BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.6 REPAIRS

- A. Touchup Painting:
 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

- a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
 2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting." Section 099123 "Interior Painting."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055000

SECTION 074213.19 - INSULATED METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Laminated-insulation-core metal wall panels.

1.2 ACTION SUBMITTALS

- A. Product Data:
 - 1. Laminated-insulation-core metal wall panels.
- B. Product Data Submittals: For each product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- C. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- D. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
- E. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below.
 - 1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.3 INFORMATIONAL SUBMITTALS

- A. Sample Warranties: For special warranties.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.7 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

1.8 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing in accordance with ASTM E72:
 1. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested in accordance with ASTM E283 at the following test-pressure difference:
- C. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E331 at the following test-pressure difference:
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

2.2 LAMINATED-INSULATION-CORE METAL WALL PANELS

- A. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and core material laminated or otherwise securely bonded to facing sheets during fabrication without use of contact adhesives, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.
- B. Wrapped-Edge, Laminated-Insulation-Core Metal Wall Panels: Formed with flush exterior panel facing wrapped over panel edges; designed for independent installation by mechanically attaching through extended panel edges to supports using concealed fasteners; with sealant or gasketed joints.
 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. Alclad.
 - b. CENTRIA, a Nucor Brand.
 - c. Kingspan Insulated Panels, Inc.
 - d. MAPES.

- e. Protean Construction Products, Inc.
2. Aluminum Sheet: Fabricate panel with exterior and interior facings of same material and thickness. Provide facings of aluminum coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Thickness: 0.040 inch.
 - b. Surface: Smooth, flat finish.
 - c. Exterior Finish: Three-coat fluoropolymer.
 - 1) Color: As selected by Architect from manufacturer's full range.
 - d. Interior Finish: Siliconized polyester.
 - 1) Color: As selected by Architect from manufacturer's full range.
 3. Core Material: Board insulation of the following type:
 - a. Molded-Polystyrene Board Insulation: ASTM C578, Type II, 1.35 lb/cu. ft., Class 2 or 3, Grade 3, with a maximum flame-spread index of 25 and a smoke-developed index of 450.
 4. Clips: Manufacturer's standard one piece, formed from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 5. Gaskets: Extruded, dry seal silicone.
 6. Sealant: Manufacturer's standard silicone.
 7. Panel Thickness: 1.0 inch.

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae,

parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 - 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.4 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

- a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are 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.
- C. Aluminum Panels and Accessories:
 - 1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3. Mica Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish with suspended mica
 - 4. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages in accordance with ASTM C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION OF METAL PANELS

- A. General: Install metal panels in accordance with manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 1. Shim or otherwise plumb substrates receiving metal panels.
 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 3. Install screw fasteners in predrilled holes.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal panel work proceeds.
 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal wall panel manufacturer.
 1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.4 INSTALLATION OF INSULATION-CORE METAL WALL PANELS

- A. General: Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels for weather seal.
1. Fasten foamed-insulation-core metal wall panels to supports with fasteners at each lapped joint at location and spacing and with fasteners recommended by manufacturer.
 2. Apply panels and associated items true to line for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
 3. Provide metal-backed washers under heads of exposed fasteners on weather side of insulated metal wall panels.
 4. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 5. Provide sealant tape at lapped joints of insulated metal wall panels and between panels and protruding equipment, vents, and accessories.
 6. Apply a continuous ribbon of sealant tape to panel side laps and elsewhere as needed to make panels weathertight.
- B. Laminated-Insulation-Core Metal Wall Panels:
1. Wrapped-Edge Panels:
 - a. Mechanically attach wall panels through extended edge of panels to supports using self-tapping fasteners. Seal joints with backer rod and sealant or manufacturer's standard gaskets.
- C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 FIELD QUALITY CONTROL

- A. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration in accordance with AAMA 501.2.
- B. Metal wall panels will be considered defective if they do not pass test and inspections.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.19

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Exterior standard steel doors and frames.
- B. Related Requirements:
 - 1. Section 087111 "Door Hardware (Descriptive Specification)" for door hardware.

1.2 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.3 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door type.
 - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories.
 - 8. Details of moldings, removable stops, and glazing.
- C. Samples for Initial Selection: For hollow-metal doors and frames with factory-applied color finishes.

- D. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Ceco Door; AADG, Inc.; ASSA ABLOY.
 - 2. Curries, AADG, Inc.; ASSA ABLOY Group.
 - 3. Steelcraft; Allegion plc.

2.2 PERFORMANCE REQUIREMENTS

- A. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.61 deg Btu/F x h x sq. ft. when tested in accordance with ASTM C518.

2.3 EXTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B. At exterior locations indicated in the Door and Frame Schedule and office door at maintenance
 - 1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A60 coating.
 - d. Edge Construction: Model 1, Full Flush.
 - e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
 - f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
 - g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
 - h. All doors thermally rated
 - 2. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
 - b. Construction: thermally broken Face welded.
 - 3. Exposed Finish: Prime.

2.4 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
 - 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
 - 3. Postinstalled Expansion Anchor: Minimum 3/8-inch-diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

2.5 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.
- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.
- G. Glazing: Comply with requirements in Section 088000 "Glazing."

2.6 FABRICATION

- A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
 1. Sidelite Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- B. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

- A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.
 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
 - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
 - b. Install frames with removable stops located on secure side of opening.
 2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
 3. Floor Anchors: Secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 4. Solidly pack mineral-fiber insulation inside frames.
 5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors.
 7. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

- b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
- 1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.
- D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

- A. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- B. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

3.4 REPAIR

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
- C. Related Sections:
 - 1. Division 08 Section “Hollow Metal Doors and Frames”.
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 80 - Fire Doors and Windows.
 - 5. NFPA 101 - Life Safety Code.
 - 6. NFPA 105 - Installation of Smoke Door Assemblies.
 - 7. State Building Codes, Local Amendments.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
 - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 - b. Complete (risers, point-to-point) access control system block wiring diagrams.
 - c. Wiring instructions for each electronic component scheduled herein.
 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Integrated Wiegand, Wireless, and IP-Enabled Access Control Products Supplier Qualifications: Integrated access control products and accessories are required to be supplied and installed through current members of the ASSA ABLOY "Authorized Channel Partner" (ACP) and "Certified Integrator" (CI) programs. Suppliers are to be factory trained, certified prior to project bid, and a direct purchaser of the specified product. Installers are to be factory trained, certified prior to project bid, and are responsible for commissioning, servicing, and warranting the installed equipment specified for the project.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
1. Function of building, purpose of each area and degree of security required.
 2. Plans for existing and future key system expansion.
 3. Requirements for key control storage and software.
 4. Installation of permanent keys, cylinder cores and software.
 5. Address and requirements for delivery of keys.
- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 3. Review sequence of operation narratives for each unique access controlled opening.
 4. Review and finalize construction schedule and verify availability of materials.
 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check

Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

- B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
 - 1. Ten years for mortise locks and latches.
 - 2. Twenty five years for manual overhead door closer bodies.
 - 3. Two years for electromechanical door hardware, unless noted otherwise.

1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 - 1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'6" to 4'0": 5" standard or heavy weight as specified.
 - 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 - 4. Hinge Options: Comply with the following:

- a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
5. Manufacturers:
- a. Bommer Industries (BO).
 - b. Hager Companies (HA).
 - c. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
- B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
1. Manufacturers:
- a. Bommer Industries (BO).
 - b. Hager Companies (HA).
 - c. Pemko (PE).
- 2.3 DOOR OPERATING TRIM
- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.
- 1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
 - 2. Furnish dust proof strikes for bottom bolts.
 - 3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
 - 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:
- a. Burns Manufacturing (BU).
 - b. Door Controls International (DC).
 - c. Rockwood (RO).
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
- 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 - 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.

3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
5. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Hiawatha, Inc. (HI).
 - c. Rockwood (RO).

2.4 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
- C. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
 1. Threaded mortise cylinders with rings and cams to suit hardware application.
 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
 4. Tubular deadlocks and other auxiliary locks.
 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 6. Keyway: Manufacturer's Standard.
- D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer's United States patents. Cylinders are to be factory keyed with owner having the ability for on-site original key cutting.
 1. Patented key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.
 2. Manufacturers:
 - a. Corbin Russwin (RU) - Access 3 AP.
 - b. Sargent (SA) - Degree DG1.
- E. Keying System: Each type of lock and cylinders to be factory keyed.
 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.

2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

F. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

G. Construction Keying: Provide construction master keyed cylinders.

H. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.5 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:
 - a. Lund Equipment (LU).
 - b. MMF Industries (MM).
 - c. Telkee (TK).

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Where specified, provide status indicators with highly reflective color and wording for “locked/unlocked” or “vacant/occupied” with custom wording options if required. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status. Indicator window size to be a minimum of 2.1” x 0.6” with a curved design allowing a 180 degree viewing angle with protective covering to prevent tampering.
2. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ML2000 Series.

- b. Sargent Manufacturing (SA) - 8200 Series.
- c. Yale Commercial(YA) - 8800FL Series.

B. Tubular Locksets:

1. Standard tubular locksets designed to fit ANSI standard 161 door prep without additional through-bolt preps.
2. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - TL3700 Series.
 - b. Sargent Manufacturing (SA) - DL Series.
 - c. Yale Commercial(YA) - RL Series.

C. Mortise Deadlocks, Small Case: ANSI/BHMA A156.36, Grade 1, small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - DL4000 Series.
 - b. Sargent Manufacturing (SA) - 4870 Series.
 - c. Yale Commercial(YA) - 350 Series.

2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.8 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - DC6000 Series.
 - b. Norton Rixson (NO) - 7500 Series.
 - c. Sargent Manufacturing (SA) - 351 Series.
 - d. Yale Commercial(YA) - 4400 Series.
- C. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.
1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - DC6000 Series.
 - b. Norton Rixson (NO) - 8500 Series.
 - c. Sargent Manufacturing (SA) - 1431 Series.
 - d. Yale Commercial(YA) - 3500 Series.

2.9 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Hiawatha, Inc. (HI).
 - c. Rockwood (RO).

2.10 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 1. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Hiawatha, Inc. (HI).
 - c. Rockwood (RO).

- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:
 - a. Norton Rixson (RF).
 - b. Rockwood (RO).
 - c. Sargent Manufacturing (SA).

2.11 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 1. National Guard Products (NG).
 2. Pemko (PE).
 3. Reese Enterprises, Inc. (RE).

2.12 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.13 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

- 1. Quantities listed are for each pair of doors, or for each single door.
- 2. The supplier is responsible for handing and sizing all products.
- 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

- B. Manufacturer's Abbreviations:

- 1. MK - McKinney
- 2. PE - Pemko
- 3. SA - SARGENT
- 4. AD - Adams Rite
- 5. RO - Rockwood
- 6. RF - Rixson
- 7. NO - Norton
- 8. SU - Securitron
- 9. LU - Lund Equipment Co

Hardware Sets

Set: 1.0

Doors: Penthouse to roof

Description: EXTERIOR HMD STOREROOM LOCK CPS CLOSER

Continuous Hinge	CFMHD1		PE	087100
Storeroom Lock	DG1 8204 TOMW	US32D	SA	087100
Surface Closer	CPS7500	689	NO	087100
Threshold	2005AT		PE	087100
Gasketing	2891AS		PE	087100
Rain Guard	346C		PE	087100
Sweep	3452AV		PE	087100

END OF SECTION 087100

SECTION 096519 - RESILIENT TILE FLOORING

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. Vinyl composition floor tile.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of resilient floor tile.
 - 1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 2. Show details of special patterns.
- C. Samples for Verification: Full-size units of each color and pattern of floor tile required.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 85 deg F, in spaces to receive floor tile during the following periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 VINYL COMPOSITION FLOOR TILE – F2

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Basis of Design: Refer to Drawings

- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch.
- E. Size: 12 by 12 inches.
- F. Colors and Patterns: Match Architect's sample.

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 floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
 - 1. Per manufacturer's standard recommendations.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install floor tiles until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 1. Lay tiles square with room axis.
- B. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 1. Lay tiles with grain running in one direction.
- C. 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.
- D. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- E. 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 marking device.
- F. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- G. Adhere floor tiles to 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.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 1. Remove adhesive and other blemishes from exposed surfaces.
 2. Sweep and vacuum surfaces thoroughly.
 3. Damp-mop surfaces to remove marks and soil.

- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply two coat(s).
- E. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 099114 - EXTERIOR PAINTING (MPI STANDARDS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Surface preparation and application of paint systems on the following exterior substrates:
 - a. Steel and iron.
 - b. Galvanized metal.
 - c. Existing painted metal surfaces.

B. Related Requirements:

- 1. Section 055000 "Metal Fabrications" for shop priming metal fabrications.

1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include preparation requirements and application instructions.

2. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 3. Indicate VOC content.
- B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
1. Submit Samples on rigid backing, 8 inches square.
 2. Apply coats on Samples in steps to show each coat required for system.
 3. Label each coat of each Sample.
 4. Label each Sample for location and application area.
- C. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in the Exterior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Benjamin Moore & Co.
 2. Sherwin Williams.

3. Tenemec.

- B. Products: Subject to compliance with requirements, provide one of the products listed in the Exterior Painting Schedule for the paint category indicated.
- C. Source Limitations: Obtain paint from single source from single manufacturer.

2.2 PAINT PRODUCTS

- A. MPI Standards: Provide products complying with MPI standards indicated and listed in its "MPI Approved Products List."
- B. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As indicated in a color schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 11.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 INSTALLATION

- A. Apply paints in accordance with manufacturer's written instructions and recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in the Exterior Painting Schedule may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed to view:

- a. Equipment, including panelboards and switch gear.
- b. Uninsulated metal piping.
- c. Uninsulated plastic piping.
- d. Pipe hangers and supports.
- e. Metal conduit.
- f. Plastic conduit.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written instructions.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
 1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
 2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
 3. Allow empty paint cans to dry before disposal.
 4. Collect waste paint by type and deliver to recycling or collection facility.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Ferrous Metal and Galvanized-Metal Substrates and existing painted metal surfaces
 1. Water-Based Light Industrial Coating System:
 - a. Prime Coat: Primer, water based. MPI 107

- 1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, 5.0 to 10.0 mils wet, 2.0 to 4.0 mils (0.051 to 0.102 mm) dry.
- b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
- c. Topcoat: Light industrial coating, exterior, water based, semi-gloss. MPI 161
 - 1) S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils (0.064 to 0.102 mm) dry, per coat.

END OF SECTION 099114

SECTION 099124 - INTERIOR PAINTING (MPI STANDARDS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.
 - 1. Concrete masonry units (CMUs).
 - 2. Galvanized metal.
 - 3. Existing painted surfaces

1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

C. Product List: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

D.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Sherwin-Williams Company (The).

B. Products: Subject to compliance with requirements, provide product listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As indicated in a color schedule.
 - 1. Ten percent of surface area will be painted with deep tones.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Masonry (Clay and CMUs): 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 2.
- G. Existing Painted Substrates: Remove grease and oil residue by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- H. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

3.3 INSTALLATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
 - 2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

- A. CMU Substrates:
 - 1. Latex System, MPI INT 4.2A:
 - a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
 - 1) Sherwin Williams Preprite Int./Ext. Block Filler B25W00025/B25WQ8025.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, semi-gloss (MPI Gloss Level 5), MPI #54.

- 1) Sherwin Williams. Promar 200 Zero VOC Semi-Gloss B31W02651/B31WQ2651.
2. Water-Based Light Industrial Coating (Pre-catalyzed) System MPI INT 4.2K:
 - a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
 - 1) Sherwin Williams Lexon Block Surfacer A24W00200/ A24WQ8200.
 - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, interior, water based, semi-gloss (MPI Gloss Level 5), MPI #153.
 - 1) Sherwin Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss, #K46W00151.
- B. Steel Substrates:
 1. Latex System, Alkyd Primer, MPI INT 5.1QQ:
 - a. Prime Coat: Primer, alkyd, anticorrosive, for metal, MPI #79.
 - b. Prime Coat: Shop primer specified in Section where substrate is specified.
 - c. Intermediate Coat: Latex, interior, matching topcoat.
 - d. Topcoat: Light industrial coating, interior, water based, semi-gloss (MPI Gloss Level 5), MPI #153.
 - 1) Sherwin Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss, #K46W00151.
- C. Galvanized-Metal Substrates:
 1. Water-Based Light-Industrial Coating System, MPI INT 5.3K:
 - a. Prime Coat: Primer, galvanized, water based, MPI #134.
 - 1) Sherwin Williams Pro Industrial Pro-Cryl Universal Primer #B66W310, or approved equal.
 - b. Intermediate Coat: Light-industrial coating, interior, water based, matching topcoat.
 - c. Topcoat at all other galvanized metal substrates: Light-industrial coating, interior, water based, semigloss (MPI Gloss Level 5), MPI #153.
 - 1) Sherwin Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss, #K46W00151, or approved equal.

END OF SECTION 099124

SECTION 142100 – Traction Elevators

14 21 23 – Electric Traction Passenger Elevators

PART 1 - GENERAL

1.1 SUMMARY AND DEFINITIONS

A. Related Documents

1. Division 01 - Supplementary General Conditions
2. 14 01 20 - Elevator Maintenance - Full Coverage Contract / Specifications
3. Request for Proposal

B. Intent

1. This section includes:
 - a. Electric traction passenger
2. The following outlines the scope of work covered in this Section:
 - a. Comprehensive “Turn-Key” modernization of one (1) 4,000 lbs. capacity geared traction elevator operating at 100 fpm. Unit ID PE2.
 - b. Base Bid - Decommissioning of one (1) 4,000 lbs. capacity geared traction elevator. Unit ID PE1.
 - 1) Contractors’ scope of work for the Decommissioning shall include:
 - a) Obtain and post a decommissioning permit from the AHJ.
 - b) Removal of fuses from mainline disconnect switch.
 - c) Mainline switch shall be opened and the cabinet sealed with a padlock.
 - d) The car and counterweight shall be lowered and landed in the pit.
 - e) Hoist ropes shall be removed.
 - f) Where landing door remain in place, the door panels shall be bolted securely in the closed position from the hoistway side.
 - g) Where landing doors are left in place, the landing openings shall be totally enclosed and strongly reinforced. Exception – the lowest landing door shall be locked from the landing side.
 - h) Following decommission as described in Code, The decommissioned elevator shall be inspected by a State Elevator Inspector to insure all components in the machine room and hoistway have been safety decommissioned according to Code.
 - c. Alternate No. 1 - PE2 only
 - 1) Add stainless steel wall panels with stainless steel reveals, by Inpro or equal
 - 2) Add anti-ligature guardrail by Inpro or equal
 - 3) Add anti-ligature vented base cover by Inpro or equal

- 4) Add anti-ligature stainless steel ceiling with new lighting and fan with access to ceiling hatch below existing cove at ceiling by Inpro or equal
 - 5) Replace VCT flooring with new VCT
- d. Alternate No. 2 – Add equipment removal to the PE1 decommissioning scope.
 - e. Alternate No. 3 – Add modernization and base bid car scope to PE1.
 - f. Alternate No. 4 – Add Alternate 1 scope to PE1 elevator, requires acceptance of Alternate No. 3.
 - g. Completion of Related Work identified herein Item 1.5.A.
 - h. This is a "TURN-KEY" project with the Elevator Contractor designated the "PRIME CONTRACTOR" for all related and non-related work specified and required unless specifically excluded or referenced to be done by others.

As this is a “Turn-Key” project, with the Elevator Contractor being the “Prime” Contractor, it is the Elevator Contractor’s responsibility to perform a detailed survey of the existing jobsite conditions to determine applicability and detailed scope for related work completion.

The Elevator Contractor is required to retain the services of trade sub-contractors that are either experienced in working as subcontractors on elevator modernization projects or that have relevant experience on similar projects. The trade sub-contractors shall be required to complete a detailed survey of related work / building conditions at this location(s) alongside the Elevator Contractor as a requirement to provide cost proposals for the related scope of work. At a minimum, trade sub-contractors that are required to be included on the Elevator Contractors project team should include:

Electrical Contractor

Mechanical Contractor

Fire / Life Safety Contractor

The Elevator Contractor is required to identify in their proposal the Trade sub-contractors utilized to compile their cost estimates included in their Base Bid.

It is the intent of this specification that the Elevator Contractor include in their Base Bid the cost to complete all elevator and related work that will be required to return each of the units to public use with no Code violations or punch-list items identified by the local Authority Having Jurisdiction (AHJ) as remaining to be completed. As such, the items Identified in Section 1.5.A of the Technical Specifications are intended to be as accurate a listing as can be compiled at the time of preparation of these documents.

However, should other related building work items be necessary to be completed to meet the requirements of the AHJ for issuance of permanent elevator operating certificates / permits, it will be the responsibility of the Elevator Contractor to complete the additional items under the scope of their Base Bid amount, with no additional costs to the Owner.

3. Related equipment shall be designed, constructed, installed and adjusted to produce the highest results with respect to smooth, quiet, convenient and efficient operation, durability, economy of maintenance, and the highest standard of safety.
4. It is not the intent of these specifications to detail the construction and design of all parts of the equipment, but it is expected that the type, materials, design, quality of work and construction of each part shall be adequate for the service required, durable, properly coordinated with all other parts, and in accordance with the best commercial standards applicable and of the highest commercial efficiency possible.
5. Electric and magnetic circuits and related parts shall be of proper size, design and material to avoid heating and arcing, and all other objectionable effects which may reduce the efficiency of operation, economy of maintenance and/or net-useful life of the apparatus.
6. Minimum requirements for design, materials, etc., are for certain parts of the equipment. Equivalent requirements approved by the Consultant shall apply to such parts as are of special design, construction or material and to which the specified requirements are not directly applicable. These minimum requirements as a whole shall be considered as establishing proportionate general minimum standards for all parts of the equipment.
7. The Consultant may permit variations from the requirement of these specifications to permit use of the Contractor's standard equipment, provided such standard equipment is in every way adequate for the intended use and meets the full intent of these specifications. All such variations proposed by the manufacturer shall be called to the attention of the Consultant and shall only be made if approved in writing prior to the award of the contract.
8. General requirements for design, materials and construction are intended primarily to apply to the heavy-duty and important parts of the equipment specifically mentioned and to other parts of similar duty and importance. Less important and light-duty parts may be of the standard design, materials and construction provided that, in the opinion of the Consultant, such standards are in accordance with the best commercial practice and are fully adequate for the purpose of use. All such variations shall be made only on the Consultant's written approval.
9. All equipment and component parts installed, supplied or provided under this contract shall be manufactured and distributed by a third-party, non-installer company servicing the vertical transportation industry.
 - a. Apparatus shall conform to the design and construction standards referenced herein and shall be rated the best commercial grade suitable for this application.
 - b. Equipment and component systems shall not employ any experimental devices or proprietary designs that could hamper and/or otherwise prohibit subsequent maintenance repairs or adjustments by all qualified contractors.
 - c. Manufacturers of the apparatus shall provide technical support and parts replacements for their equipment and component systems for a minimum of twenty (20) years and issue such guarantee of support to the purchaser with written certification naming the final Owner of their product(s) to ensure the apparatus or systems remain maintainable regardless of who may be selected for future service.
10. All equipment provided shall be factory and field tested with a history of design reliability and net-useful life established.
 - a. Contractor must be able to demonstrate the apparatus to be installed has been used successfully in a substantially similar manner under comparable conditions.
 - b. If the apparatus proposed differs substantially in construction, material composition, design, size, capacity, duty or other such rating from the equipment previously used for the same purpose by the manufacturer, the Consultant may reject the apparatus

or require the vendor test and demonstrate the adequacy and suitability for this particular situation. Any necessary tests shall be performed at the sole expense of the Contractor with no prior guarantee of acceptance after the testing procedure.

11. The Contractor shall not use as part of the permanent equipment any experimental devices, proprietary design, components, construction of materials which have not been fully tried out in at least substantially similar or under comparable service, except as may be especially approved by the Consultant. If any important equipment or devices to be used on this installation differ substantially in construction, materials, design, size, capacity or duty from corresponding items previously used for the same purpose by the manufacturer, they shall pass such tests as the Consultant may require to fully show their adequacy and suitability. These tests shall be in addition to tests herein specified and shall be made at the expense of the Contractor.
12. Certain design limitations, tests, etc., are herein specified as a partial check of the adequacy of design, construction and materials used. These requirements do not cover all features necessary to ensure satisfactory and approved operation, etc., of the equipment.
13. It is understood, the entire system shall be designed, fabricated, modified and/or upgraded in full compliance with applicable local laws and code standards. The absence of a particular item or requirement shall not relieve the Contractor of the full and sole responsibility for such equipment, features and/or procedures.
14. With the exception of only those items specifically identified as being performed by others, the Specifications are intended to include all engineering, material, labor, testing, and inspections needed to achieve work specified by the Contract Documents. Inasmuch as it is understood that any incidental work necessary to complete the project is also covered by the Specifications, bidders are cautioned to familiarize themselves with the existing job site conditions. Additional charges for material or labor shall not be permitted subsequent to execution of the Contract.
15. Bidders must report discrepancies or ambiguities occurring in the Specifications to the Consultant for resolution prior to the bidding deadline, otherwise the Specifications shall be deemed acceptable in their existing form.

C. Termination of Existing Agreement(s)

1. By submitting a bid, the existing maintenance provider agrees that any service contract(s) in effect shall be terminated by the Owner should the project be awarded to another vendor upon thirty (30) day written notice to the Contractor by the Owner.
 - a. The contract(s) shall be terminated with no penalty to the Owner or Contractor.
 - b. Owner will be responsible for money owed the Contractor for services provided and work performed up until the date of cancellation.

D. Abbreviations and Symbols

1. The following abbreviations, Associations, Institutions, and Societies may appear in the Project Manual or Contract Documents:

ADA	Americans with Disabilities Act
AHJ	Authority Having Jurisdiction
AIA	American Institute of Architects
ANSI	American National Standards Institute

ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
IBC	International Building Code
IEEE	Institute of Electrical and Electronics Engineers
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Agency
OSHA	Occupational Safety and Health Act

E. Codes and Ordinances / Regulatory Agencies

1. Work specified by the Contract Documents shall be performed in compliance with applicable Federal, State, and municipal codes and ordinances in effect at the time of Contract execution. Regulations of the Authority Having Jurisdiction shall be fulfilled by the Contractor and Subcontractors. The entire installation, when completed, shall conform with all applicable regulations set forth in the latest editions of:
 - a. Local and/or State laws applicable for logistical area of project work.
 - b. Building Code applicable to the AHJ.
 - c. Elevator Code applicable to the AHJ.
 - d. Safety Code for Elevators and Escalators, ASME A17.1 and all supplements as modified and adopted by the AHJ.
 - e. Safety Code for Elevators and Escalators, A17.1S supplement to A17.1 as modified and adopted by the AHJ for Machine Room Less installations (MRL).
 - f. Guide for Inspection of Elevators, Escalators, and Moving Walks, ASME A17.2.
 - g. Safety Code for Existing Elevators and Escalators, ASME A17.3 as modified and adopted by the AHJ.
 - h. Guide for emergency evacuation of passengers from elevators, ASME A17.4.
 - i. National Electrical Code (ANSI/NFPA 70).
 - j. American with Disabilities Act - Accessibility Guidelines for Building and Facilities and/or A117.1 Accessibility as may be applicable to the AHJ.
 - k. ASME A17.5/CSA-B44.1 - Elevator and escalator electrical equipment.
 - l. ECC (Energy Conservation Code) as may be applicable to the AHJ.
2. The Contractor shall advise the Owner's Representative of pending code changes that could be applicable to this project and provide quotations for compliance with related costs.

F. Reference Standards

1. AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
2. ANSI/AWS D1.1 - Structural Welding Code, Steel.
3. ANSI/NFPA 80 - Fire Doors and Windows.
4. ANSI/UL 10B - Fire Tests of Door Assemblies.
5. ANSI/IEEE - 519-Latest Edition.
6. ANSI/IEEE - Guide for Surge Withstand Capability (SWC) Tests.
7. ANSI Z97.1 – Laminated/Safety Tempered Glass.

G. Definitions

1. Defective Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
2. Provide: Where used in this document, provide shall mean to install new device, apparatus, system, equipment or feature as specified in this document.
3. Definitions in ASME A17.1 as amended or modified by the AHJ apply to work of this Section.

1.2 PERMITS AND SUBMITTALS

A. Permits

1. Comply with the requirements of Division 01.
2. Prior to commencing work specified by the Contract Documents, the Contractor shall, at its own expense, obtain all permits or variances as may be required by the AHJ and provide satisfactory evidence of having obtained said permits and variances to both the Owner's Representative and Consultant.
3. File necessary drawings for approval of all Authorities Having Jurisdiction.
4. The Elevator Contractor shall undertake the necessary review and search procedure to identify open applications and/or outstanding violations for this property; and, close-out such applications and/or expunge such violations relative to the project scope as required for final acceptance by the AHJ.
 - a. Outstanding applications and violations must be indicated on the request for permit filing for this procedure to ensure such applications and/or violations are dismissed accordingly.
 - b. All relative costs shall be included in the base bid proposal with the understanding that corrective actions are covered under the specified scope of work.

B. Submittals

1. Prior to beginning the work, the Contractor shall submit and have approved copies of layout drawings, shop drawings and standard cuts. These items shall include:
 - a. A plan view of the hoistway and machine room.
 - b. Elevation of the pit.
 - c. All accessories.
2. The Consultant and the Owner's Representative shall pass on the submittals with reasonable promptness and the Contractor shall be responsible to ensure that there will be no delay in their work or that of any other trade involved.
3. Approved filing and submittal requirements must be completed before equipment and related materials are ordered.
4. Copies of Department of Buildings' permits and/or governing authority's documents will be posted at the job site with copies issued to the Owner's Agent, Owner's Representative and Consultant.
5. Samples of wood, metal, plastic, paint or other architectural finish material applicable to this project shall be submitted for approval by the Owner's designee.

6. It shall be understood that approval of the drawings and cuts by Owner's designee, Architect and/or Consultant shall be for general arrangement only and does not include measurements which are the Contractor's responsibility or approval of variations from the contract documents required by the AHJ.
7. The Contractor shall prepare a record log and maintain all submittals, shop drawings, catalog cuts and samples.

C. Measurements and Drawings

1. Drawings or measurements included with the bidding material shall be for the convenience of the bidders only and full responsibility for detailed dimensions lies with the Contractor.
2. In the execution of the work on the job, the Contractor shall verify all dimensions with the actual conditions.
3. Where the work of the Elevator Contractor is to join other trades, the shop drawings shall show the actual dimensions and the method of joining the work of the various trades.

D. Changes in Scope and Extra Work

1. The Owner may at any time make changes in the specifications, plans and drawings, omit work, and require additional work to be performed by the Contractor.
 - a. Each such addition or deletion to the Contract shall require the Owner and the Contractor to negotiate a mutually acceptable adjustment in the contract price, and, for the Contractor to issue a change order describing the nature of the change and the amount of price adjustment.
 - b. The Contractor shall make no additions, changes, alterations or omissions or perform extra work except on written authorization of the Owner.
 - c. Each change order shall be executed by the Contractor, Owner, and the Consultant.

E. Keys

1. Upon the initial acceptance of work specified by the Contract Documents on each unit, the Contractor shall deliver to the Owner, six (6) keys for each general key-operated device that is provided under these specifications in accordance with ASME A17.1, Part 8 standards as may be adopted and modified by the AHJ.
2. All other keying of access or operation of equipment shall be provided in accordance with ASME A17.1 Part 8 as may be adopted and modified by the AHJ.

F. Diagnostic Tools

1. Prior to seeking final acceptance of the project, the Contractor shall deliver to the Owner any specialized tools required to perform diagnostic evaluations, adjustments, and/or programming changes on any microprocessor-based control equipment installed by the Contractor. All such tools shall become the property of the Owner.
 - a. Owner's diagnostic tools shall be configured to perform all levels of diagnostics, systems adjustment and software program changes which are available to the Contractor.
 - b. Owner's diagnostic tools that require periodic re-calibration and/or re-initiation shall be performed by the Contractor at no additional cost to the Owner for a period equal

to the term of the maintenance agreement from the date of final acceptance of the project.

- c. The Contractor shall provide a temporary replacement, at no additional cost to the Owner, during those intervals in which the Owner might find it necessary to surrender a diagnostic tool for re-calibration, re-initiation or repair.
2. Contractor shall deliver to the Owner, printed instructions, access codes, passwords or other proprietary information necessary to interface with the microprocessor-control equipment.

G. Service Support Requirements

1. Software / Firmware Updates

- a. During the life of the equipment and subject to the term of the maintenance agreement, where revisions to firmware and/or software are issued by the control manufacturer or manufacturer of solid state and microprocessor based subsystems subsequent to the beneficial use of the equipment, updates shall be provided so that the installation and spare circuit boards are current with respect to software and firmware versions.

H. Wiring Diagrams, Operating Manuals and Maintenance Data

1. Comply with the requirements of Division 01.
2. Deliver to the Owner, four (4) identical volumes of printed information organized into neatly bound manuals prior to seeking final acceptance of the project.
3. The manuals shall also be submitted in electronic format on non-volatile media, incorporating raw 'CAD' and/or Acrobat 'PDF' file formats.
4. Manuals, as well as electronic copies, shall contain the following:
 - a. Step-by-step adjusting, programming and troubleshooting procedures that pertain to the solid-state microprocessor-control and motor drive equipment.
 - b. Passwords or identification codes required to gain access to each software program in order to perform diagnostics or program changes.
 - c. A composite listing of the individual settings chosen for variable software parameters stored in the software programs of both the motion and dispatch controllers.
 - d. Method of control and operation.
5. Provide four (4) sets of "AS INSTALLED" straight-line wiring diagrams in both hard and electronic format in accordance with the following requirements:
 - a. Displaying name and symbol of each relay, switch or other electrical component utilized including identification of each wiring terminal.
 - b. Electrical circuits depicted shall include all those which are hard wired in both the machine room and hoistway.
 - c. Supplemental wiring changes performed in the field shall be incorporated into the diagrams in order to accurately replicate the completed installation.
6. Furnish four (4) bound instructions and recommendations for maintenance, with special reference to lubrication and lubricants.

7. Manuals or photographs showing controller repair parts with part numbers listed.

I. Training

1. Prior to seeking final acceptance of the project, the Contractor shall conduct a training program on-site with building personnel selected by the Owner.
2. The focus of the session shall include:
 - a. Instructions on proper safety procedures and who to contact for the purpose of assisting passengers that may become entrapped inside an elevator car.
 - b. Explain each control feature and its correct sequence of operation.
3. Control features covered shall include but, not be limited to:
 - a. Independent Service Operation.
 - b. Emergency Fire Recall Operation - Phase I.
 - c. Emergency In-car Operation - Phase II.
 - d. Emergency Power Operation.
 - e. Emergency Communications Equipment.
 - f. Security Operating Features.

J. Advertising

1. Advertising privileges shall be retained by the Owner.
2. It shall be the responsibility of the Contractor to keep the job site free of posters, signs, and/or decorations.
3. Contractor's logo shall not appear on faceplates or entrance sills without the approval of the Owner.

1.3 QUALITY ASSURANCE

A. Materials and Quality of Work

1. All materials are to be new and of the best quality of the kind specified.
2. Installation of such materials shall be accomplished in a neat manner and be of the highest quality.
 - a. Should the Contractor receive written notification from the Owner stating the presence of inferior, improper, or unsound materials or quality of installation, the Contractor shall, within twenty-four (24) hours, remove such work or materials and make good all other work or materials damaged.
 - b. Should the Owner permit said work or materials to remain, the Owner shall be allowed the difference in value or shall, at its election, have the right to have said work or materials repaired or replaced as well as the damage caused thereby, at the expense of the Contractor, at any time within one (1) year after the completion of the work; and neither payment made to the Contractor, nor any other acts of the Owner shall be construed as evidence of acceptance and waiver.

B. Materials, Painting and Finishes

1. Two (2) coats of rust inhibiting machinery enamel shall be applied to exposed ferrous metal surfaces in the pit that do not have a galvanized, anodized, baked enamel, or special architectural finishes.
2. Two (2) coats of rust inhibiting enamel paint to the machinery located within the machine room and secondary level (where applicable) as well as to the machine room floors.
3. Architectural metal surfaces of bronze or similar non-ferrous materials which are specified to be refinished, re clad and/or provided new, shall be sufficiently clear coated so as to resist tarnishing during normal usage for a period of not less than twelve (12) months after final acceptance by the Owner.
4. Identify all equipment including buffers, crosshead, safety plank, machine, controller, drive, governor, disconnect switch, etc., by four inches (4") high numerals which shall contrast with the background to which it is applied. The identification shall be either decalcomania or stencil type.
5. Paint or provide decal-type floor designation not less than six inches (6") high on hoistway doors (hoistway side), fascias and/or walls as required by Code at intervals not exceeding seven feet (7'-0"). The color of paint used shall contrast with the color of the surface to which it is applied.

C. Accessibility Requirements

1. Locate the alarm button and emergency stop switch at thirty-five inches (35"), and floor and control buttons not more than forty-eight inches (48") above the finished floor. The alarm button shall illuminate when pressed for visual acknowledgement to user.
2. Provide raised markings in the panel to the left of the car call and other control buttons. Letters and numbers shall be a minimum of five-eighths inch (5/8") and raised three-hundredths inch (.03") and shall be in contrasting color to the call buttons and cover plate.
3. The centerline of new hall push button shall be forty-two inches (42") above the finished floor.
4. The hall arrival lanterns or cab direction lantern provided shall sound once for the "up" direction and twice for the "down" direction. Design and locate fixtures per Federal standards.
5. Provide floor designations at each entrance on both sides of jamb at a height of sixty inches (60") above the floor.
 - a. Use cast metal plates and polished numbers secured with tamper-proof hardware.
 - b. Designations shall be two inches (2") high, raised three-hundredths inch (.03") on a contrasting color background as selected by the Owner.
6. Provide an audible signal within the elevator to tell passenger that the car is stopping or passing a floor served by the elevator.
7. Where elevators operate at a speed greater than 200 fpm, provide a verbal annunciator to announce the floor at which the elevator is stopping where required by the AHJ.
8. Provide signal control timing for passenger entry/exit transitions per Federal and/or Local standards.
9. Ensure sill-to-sill running clearances do not exceed one and one-quarter inches (1-1/4") at all landings served.
10. Provide visual call acknowledgment signal for car emergency intercommunication device.

1.4 DELIVERY / STORAGE / HANDLING / COORDINATION

A. Delivery and Storage of Material and Tools

1. Comply with the requirements of Division 01.
2. Delivery, Storage and Handling:
 - a. Deliver materials to the site ready for use in the accepted manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand name and manufacturer's name. Delivered materials shall be identical to accepted samples.
 - b. Store materials under cover in a dry and clean location, off the ground.
 - c. Remove delivered materials which are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials.
3. The Owner shall bear no responsibility for the materials, equipment or tools of the Contractor and shall not be liable for any loss thereof or damage thereto.
4. The Contractor shall confine storage of materials on the job site to the limits and locations designated by the Owner and shall not unnecessarily encumber the premises or overload any portion with materials to a greater extent than the structural design load of the Facility.

B. Work with Other Trades / Coordination

1. Coordinate installation of sleeves, block outs, equipment with integral anchors, and other items that are embedded in concrete or masonry for the applicable equipment. Furnish templates, sleeves, equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
2. Coordinate sequence of installation with other work to avoid delaying the Work.
3. Coordinate locations and dimensions of other work relating to the equipment scheduled for installation including pit ladders, sumps, and floor drains in pits; entrance subsills; machine beams; and electrical service, electrical outlets, lights, and switches in pits and machine rooms, secondary levels, overhead sheave rooms and hoistways as it relates to the specific equipment.

C. Removal of Rubbish and Existing Equipment

1. On a scheduled basis, the Contractor shall remove all rubbish generated in performing work specified in the Contract Documents from the job site.
2. Any component of the existing elevator plant that is not reused under the scope of work specified in the Contract Documents shall become property of the Contractor and, as such, shall be removed from the premises at the Contractor's sole expense.
3. The Contractor agrees to dispose of the aforementioned equipment and rubbish in accordance with any and all applicable Federal, State, and municipal environmental regulations, and further accepts all liability that may result from handling and/or disposing of said material.

D. Protection of Work and Property

1. The Contractor shall continuously maintain adequate protection of all their work from damage and shall protect the Owner's property from injury or loss arising out of this contract.

2. The Contractor shall make good any such damages, injury or loss, except such as may be directly caused by agents or employees of the Owner.
3. The Contractor shall provide all barricades required to protect open hoistways or shafts per OSHA regulations. Such protection shall include any necessary guards or other barricades for employee protections during and after the modernization procedure.

1.5 RELATED WORK

A. Work by Elevator Contractor Included in the Base Bid

1. The following requirements shall be applicable based on prevailing conditions at the site of work and/or mandated modifications for code compliance.
 - a. Installation of new fully enclosed, externally operated, fused (or circuit breaker), main line and/or auxiliary disconnect switch(es), with 4th wire ground, properly located in accordance with local law that can be locked in the open (off) position.
 - b. Provide remote/auxiliary disconnects where new (either by the Elevator Contractor or by others) or existing disconnect switches are not in line-of-sight of the controller.
 - c. Installation of new electrical conduit and power feeders between the load side of existing and new main line disconnect switches and new elevator control equipment.
 - d. Provide auxiliary power feeds with required distribution load center (circuit breaker panel) for intercommunication, CCTV systems, cab lighting or other specialty devices existing or to be provided by the Elevator Contractor.
 - 1) Voltage shall be 110 VAC with one (1) 15 Amp circuit breaker or fuse for lighting of each individual elevator car enclosure.
 - 2) Circuit breakers and/or fused disconnects shall be lockable in the “OFF” position in accordance with applicable code.
 - e. Provide hoist rope guards at the car and counterweight drop side of the hoisting machine sheave to prevent accidental contact with the hoisting ropes. The guard shall extend from the point where the hoisting ropes penetrate the machine room floor slab to a point beyond where the ropes contact the traction and deflector sheaves. The guards shall be constructed so as to conceal pinch-points between ropes and sheave grooves.
 - f. The top surface of any setback or projection in the hoistway that measures 2” or more in width shall be beveled at an angle of not less than 75 degrees from horizontal. Each bevel plate shall be constructed from prime painted 14 gauge cold-rolled steel and installed so as to conform with ASME A17.1 elevator safety code as modified by, and/or in addition to codes and standards accepted by the AHJ.
 - g. Installation of new permanent dual lamp LED lighting fixtures with protective guards and 110-volt duplex GFI receptacles inside the machine room. Illumination shall be no less than thirty (30) footcandles at floor level. A light control switch shall be provided immediately adjacent to the machine room entrance door. Provide necessary receptacles as required to supply power to auxiliary elevator equipment and/or remotely located monitors.
 - h. Provide each elevator pit with a 110 volt GFI duplex receptacle and a permanent dual lamp LED lighting fixture equipped with protective guard. Illumination shall be no less than ten (10) footcandles at pit floor level. A light control switch must be

provided and so positioned as to be readily accessible from the pit entrance door or ladder.

- i. Provide the following signage, plates and tags:
 - 1) Provide access doors to each elevator machine room with signs that read “ELEVATOR MACHINE ROOM.” Letters shall be not less than 2” high.
 - 2) Provide all required manufacturer data plates and installation-specific tags and signs of the types and styles containing information as required by applicable Codes and Standards as adopted and/or modified by the AHJ.

- j. Where the pit extends more than 3' below the sill of the pit access door, provide a permanent fixed metal ladder.
 - 1) Ladder shall extend no less than 48” above the sill of the access door. Handgrips shall extend from the ladder to a point no less than 48” above the sill of the access door where the ladder does not comply.
 - 2) The rungs shall be a minimum of 16” wide. Where prevailing conditions prevent a 16” wide rung, the rung may be reduced to no less than 9”.
 - 3) The rungs shall be spaced 12” on center.
 - 4) A clear distance of no less than 4 ½” from the centerline of the rungs and handgrips to the nearest permanent object in back of the ladder shall be provided.
 - a) Where prevailing conditions prohibit the installation of the required ladder as specified above, the Elevator Contractor shall coordinate requirements necessary for compliance with the Authority Having Jurisdiction.

- k. Provide a standard railing conforming to Code on the outside perimeter of the car top on all sides where the perpendicular distance between the edges of the car top and the adjacent hoistway enclosure exceeds 300 mm (12") horizontal clearance or as otherwise required by the Authority Having Jurisdiction.
- l. Provide necessary patching, repairing and installation of masonry and/or dry wall for smooth and legal elevator hoistways.
- m. Provide any required repair of smoke holes with subway grating covers in the machine rooms where applicable. All smoke ventilation provisions, including duct work, dampers, fans, fire control interfaces, in accordance with local codes, shall be reviewed for proper operation.
- n. Installation of new drains and sump pumps per architectural plans.
- o. Installation of HVAC provisions inside the machine room so as to maintain ambient temperature and humidity levels that are within the range specified by the microprocessor-control equipment manufacturers. Contractor shall furnish and install minimum two (2) Ton BTU “Split-Coil” HVAC system manufactured by Mitsubishi, Daikin or General Electric. One (1) unit shall be installed in each machine room. Contractor is to provide all labor and material for cutting, coring, or drilling as required for installation of interior head unit to exterior compressor unit. Contractor is required to provide all electrical connections and from HVAC unit to building power supply to properly operate each new HCAV unit including all cutting, coring, drilling as necessary to run electrical piping and conduit.
- p. Installation of new or modification of existing fire emergency control interface provisions for automatic recall of the elevator(s) through operation of the fire

detection system. Provisions shall be made for primary, alternate and third-zone (Fire-Hat) designated fire recall landing with connection contingent on Codes recognized by the local governing authority. The interfacing contacts shall be wired to an electrical junction box located inside each elevator machine room for connection to the elevator control systems by the Elevator Contractor. Each wire shall be clearly labeled with its control function. Coordinate the type of interface required for the specific elevator control apparatus with the Elevator Contractor.

- 1) Installation of fire / smoke detecting devices in the elevator machine room, elevator lobbies, top of shaft and / or pit as required for elevator fire recall operation to meet current requirements of A17.1 and/or the local Governing Authority. Connection and programming of these new devices to existing building fire alarm control panel.
 - 2) Modification of existing fire alarm control panel and interface / wiring to panel as required to accommodate new heat / smoke detecting devices or new elevator fire recall zones, including installation of expansion panel and new power supply(s) (if required) to existing FACP.
 - 3) Software modifications as required to the existing fire alarm control panel as required to accommodate new smoke / heat detecting devices, new elevator fire recall zones, or expansion panel (if required).
 - 4) All wiring, piping, coring, cutting, patching, as required for new ducts / conduits to connect new or modified components of the fire alarm control system to operate elevator fire recall to meet current requirements of ASME A.17.1 and/or the local Governing Authority.
- q. Subsequent to the contract execution, the Contractor shall perform the following procedures and engineering tasks relative to balance loading of system and cab work included under base specification requirements and alternative/optional upgrades:
- 1) Perform balance load testing to determine existing conditions and requirements applicable to new/modified equipment.
 - 2) Provide data for Purchaser and/or their agents to evaluate any limitations that may be placed on design/finish options due to prevailing conditions or total suspended loading.
- r. Subsequent to the contract execution, the Contractor shall perform a Violation search and review of all open Applications in conjunction with the filing procedure. Subsequently, any and all outstanding Violations and/or open Applications shall be indicated on the Request for Permit; and such outstanding Violations shall be expunged and open Applications closed out as part of this filing procedure.
- 1) If requirements and/or work necessary to satisfy outstanding Violation or Applications are not included in the contracted scope of work, the Elevator Contractor shall prepare an itemized listing with relative extra costs to cure the condition(s) and expunge and/or close out the Violation or Application for the Owners' and Consultants' review/approval prior to executing such work procedures.

B. Work by Others

1. The following requirements shall be applicable based on prevailing conditions at the site of work and/or mandated modifications for code compliance.
 - a. Provide a class “ABC” fire extinguisher in electrical machinery and control spaces. Locate the extinguisher in close proximity to the access door.
 - b. Provide necessary telephone wiring with connection to local telephone service for remote elevator monitoring and/or two-way voice emergency communications systems.
 - 1) Terminate the telephone wiring in junction boxes or standard phone jack terminals in the machine room.
 - 2) Coordinate the quantity and termination method of individual phone connections with the Elevator Contractor.
 - 3) Identify each phone line for connection by the Elevator Contractor to the appropriate elevator device(s).
 - 4) Telephone wiring, where required by applicable codes, shall be installed in conduit.

1.6 WARRANTY / MAINTENANCE SERVICES

A. Contract Close-Out, Guarantee and Warranties

1. Comply with the requirements of Division 01.
2. Guarantee and Warranties:
 - a. Warrant the equipment installed under these specifications against defects in material and quality of installation and correct any defects not due to ordinary wear and tear or improper use of car which may develop within one (1) year from the date each unit is completed and placed in permanent operation and accepted by the Owner.
 - b. This warrantee shall be written and issued at the completion of each unit prior to final payment.

B. Maintenance Coverage

1. The following maintenance coverage apply:
 - a. Interim Maintenance
 - 1) Provide full protective maintenance services and equipment coverage for one (1) month prior to the commencement of work, and during the work implementation procedure, until final acceptance of the finished project.
 - 2) Interim full comprehensive maintenance services shall be provided in accordance with the Contractor’s Form of Full Protective Maintenance Services submitted with the bidding documents as further specified.
 - 3) Costs related to interim maintenance shall be included in the base bid quotation.
 - b. Guarantee Maintenance

- 1) Provide full comprehensive preventative maintenance services for a period of twelve (12) months after the final completion and acceptance of the project.
 - 2) Guarantee maintenance and related services shall be provided in accordance with the Contractor's Form of Full Protective Maintenance Services submitted with the bidding documents as further specified.
 - 3) Costs related to guarantee maintenance shall be included in the base bid quotation.
2. Contractor's Form of Full Protective Maintenance Service
- a. The maintenance work shall be performed by elevator personnel directly employed and supervised by the manufacturer and installer of the equipment who are experienced and skilled in maintaining elevators similar to those to be maintained under this agreement.
 - b. Except for emergency minor adjustment call-back service, all work shall be performed during the regular working hours of regular working days of the trade. If, at any time, it should become necessary, and only when so authorized by the owner to perform any portion of the work other than emergency call-back service during overtime hours, the maintenance contractor shall be reimbursed at the established billing rates for the difference between regular and overtime labor.
 - c. Maintenance contractor shall maintain all parts of the elevators consisting of, but not limited to, machines, motors, solid-state motor drives, positioning systems, pumps, valves, cylinder head, above ground piping, hoses, fittings, gauges, seals, O-rings, filters, screens, packing, belts, recovery devices, recuator, above ground cylinder and plunger assemblies, mufflers, heaters, shut-off valves, valves, brushes, controllers, selectors, worms, gears, thrusts, bearings, brake magnets coils, brake shoes, windings, rotating elements, contacts coils and resistances for operating and motor control circuits, magnet frames, leveling devices, cams, car and hoistway door hangers, tracks and guides, door operating devices, door protection systems, hall lanterns and all other elevator operating, signal and accessory equipment complete.
 - d. The maintenance work shall consist of the following.
 - 1) All maintenance shall comply with Part 8 of the ASME A 17.1 Code as may be modified or amended by the Authority Having Jurisdiction.
 - 2) Supplying, repairing, and replacing of all parts of every description made necessary by wear and tear at the maintenance contractor's cost. Only parts that are correctly designed and suitable in all respects shall be used. The maintenance contractor shall have and maintain on hand locally a supply of spare parts sufficient for the normal maintenance and repair of the equipment. The following items of elevator equipment are excluded: Car enclosures, hoistway enclosures, hoistway doors, door frames and sills, fluorescent light bulbs.
 - 3) Repairing and/or replacing all electrical wiring and conductors, extending to the elevator from the mainline switch or circuit breaker. Mainline switch fuses are excluded.
 - 4) Keeping the guide rails clean and properly lubricated, except when roller type guides are involved no rail lubrication shall be used. When necessary, the maintenance contractor shall renew guide shoe gibs or rollers as required to ensure smooth and quiet operation. All oil reservoirs shall be kept properly sealed to prevent leakage.

- 5) Keeping the exterior of the machinery and any other parts of the equipment subject to rust properly painted and presentable at all times. The motor windings and controller coils are to be periodically treated with proper insulating compound.
- e. The performance of mandated inspections and tests of the equipment, as required by the AHJ, shall be included in this agreement.
 - 1) Where required by the AHJ, witnessing shall be performed by a third-party licensed agency hired by the Owner.
 - 2) Where testing is required to be performed after normal business hours, Contractor shall invoice the after-hours work at the premium portion of the hourly billing rate only.
- f. The maintenance contractor shall not be required to make renewals or repairs necessitated by reason of negligence or misuse of the equipment by persons other than the maintenance contractor, their representatives and employees, or by reason of any other cause beyond the control of the maintenance contractor, except ordinary wear and tear. The maintenance contractor shall not be required under this agreement to install new attachment as may be recommended or directed by insurance companies or Governmental Authorities.
- g. This service shall be performed solely by the manufacturer and installer of the equipment and shall not be assigned or transferred to any agent or subcontractor.

1.7 ALLOWANCES / ALTERNATES

A. Alternates

1. Alternate No. 1 – PE2 only
 - a. Add stainless steel wall panels with stainless steel reveals, by Inpro or equal
 - b. Add anti-ligature guardrail by Inpro or equal
 - c. Add anti-ligature vented base cover by Inpro or equal
 - d. Add anti-ligature stainless steel ceiling with new lighting and fan with access to ceiling hatch below existing cove at ceiling by Inpro or equal
 - e. Replace VCT flooring with new VCT
2. Alternate No. 2 – Add equipment removal to the PE1 decommissioning scope.
3. Alternate No. 3 – Add modernization and base bid car scope to PE1.
4. Alternate No. 4 – Add Alternate 1 scope to PE1 elevator, requires acceptance of Alternate No. 3.

PART 2 - PRODUCTS

2.1 GENERAL DESCRIPTION

A. Elevator – PE1 - Base Bid

PE1 & PE2 – Alternate No. 3

1.	Quantity	One (1) – Base Bid Two (2) – <u>Alternate No. 3</u>
2.	Type	Geared Traction / Passenger
3.	Capacity (lbs.)	4,000 lbs.
4.	Speed (fpm)	100 fpm
5.	Travel in Feet	Existing
6.	Number of Landings	Five (5)
7.	Number of Openings	Five (5)
8.	Front Opening	All
9.	Rear Opening	None
10.	Operation	Simplex selective collective
11.	Control	Variable voltage variable frequency
12.	Fireman’s Control	Phase I and II
13.	Number of Push Button Risers	One (1)
14.	Platform Size	Existing
15.	Guide Rails	Steel tees – Reuse
16.	Buffers	Spring - Reuse
17.	Cab Interior Remodel	\$15,000 material allowance per car
18.	Entrance Size	48” wide x 84” high
19.	Door Operation	Two (2) speed side opening
20.	Machine Type	Geared traction - New
21.	Machine Location	Overhead
22.	Counterweight Safety	Not Required
23.	Power Supply	220 – 3 – 60 (Contractor to verify)

2.2 MANUFACTURERS

A. Pre-Approved Equipment Manufacturers

1. The following manufacturer’s equipment and materials have been pre-approved for use on this project.
2. Other equipment not specifically mentioned shall be considered for approval on an individual basis.
3. Certain Original Equipment Manufacturers equipment is acceptable unless otherwise specified.
 - a. Controller - GAL (GALaxy), Motion Control Engineering, Elevator Controls Corporation, Elevator Systems, Inc., Smartrise.
 - b. Tracks, Hangers, Interlocks and Door Operators - G.A.L., ECI.
 - c. Fixtures - G.A.L., Adams, EPCO, Monitor, E-Motive USA, C.E. Electronics, Innovation, PTL, MAD, National.
 - d. Door Protective Device - Janus, Adams, G.A.L., T.L. Jones, Tri-Tronics.
 - e. Cabs and Entrances/Entrance Door Panels - Accurate Elevator Door Corp, CEC Elevator Cab, EDI/ECI, Elite Elevator Cab, National Cab & Door, Tyler, Velis, Gunderlin, Premier, Prestige, Regency, Columbia Elevator Products, United Cabs.
 - f. Machines - Hollister-Whitney, Titan, Imperial, Torin.
 - g. Motors - Imperial Electric, General Electric, Baldor, Reuland Electric.
 - h. VVVF Power Drives - Mitsubishi, MagneTek, Yaskawa, TorqMax.

- i. Electrical Traveling Cables - Draka, James Monroe.
 - j. Guide Shoes/Rollers – ELSCO, G.A.L.
 - k. Wire Ropes - Paulsen, Bethlehem, Wayland, Draka.
 - l. Intercommunications/Telephones - Webb Electronics, K-Tec, Ring, Wurtec, Janus, approved equal.
4. Original Equipment Manufacturers may substitute their own branded equipment subject to the following:
- a. All requirements of the specifications are met regarding performance, appearance, serviceability and support.
 - b. A full stock of all regular and critical replacement parts required for this project are maintained at a facility within fifty (50) miles of the project site.
 - 1) Any parts not stocked at the above referenced facility shall be identified with the location of the nearest source and shall be available for next-day delivery upon demand.
 - c. All parts and software shall be made available for purchase to a qualified elevator maintenance firm with one (1) business day delivery without direct Owner involvement.
 - 1) Provide details of parts supply facility and a list of current parts pricing for all major components required for the installation.
 - d. All specialized tools, equipment, software, and passwords, required to maintain, repair, adjust the operation, and perform code mandated inspections are provided to the Owner as part of the base installation.
 - 1) Updates to these items shall be available via the parts supply facility referenced above.
 - e. Technical support of the product(s) shall be available to the Owner’s elevator service provider.

2.3 CONTROL FEATURES / OPERATION

A. Motion Control

- 1. Smooth stepless acceleration and deceleration of the elevator car shall be provided in either direction of travel during both single and multiple floor runs.
- 2. Use digital logic to calculate optimum acceleration and deceleration patterns during each run.
- 3. Acceleration, deceleration, jerk, maximum velocity, leveling accuracy and elapsed flight time, for a typical elevator one (1) floor run, shall not exceed values as further specified.

B. Simplex Selective Collective Operation

- 1. Provide simplex selective collective operation from a riser of hall push button stations.
- 2. The registration of one (1) or more car calls shall dispatch the car to the selected floors.

- a. The car shall also respond to registered hall calls in the same direction of travel.
 - b. Car and hall calls shall be canceled when answered.
3. Stops in response to calls that are registered in either the car or hall push button stations shall occur in the natural order of progression in which the floors are encountered, depending on the direction of car travel, and irrespective of the order in which calls are registered.
 4. When the car has responded to the highest or lowest call, and calls are registered for the opposite direction, the car shall reverse direction automatically and respond to those registered calls.
 5. When the car arrives at its last stop and reverses direction of travel, all previously registered car calls shall be automatically cancelled.
 6. When the car arrives at a landing where both up and down hall calls are registered, it will answer the call in the direction of travel.
 - a. After a pre-determined delay, if no car call is registered, the car shall respond to calls registered for the opposite direction. Car doors shall close immediately, re-open, and respond to the call for the opposite direction.
 - b. Hall lantern operation shall always correspond to direction of service.
 7. When an empty car reverses direction at a landing with no hall calls, the doors shall not open and the hall lantern shall not operate.
 8. If the car has no car calls registered and arrives at a floor where both up and down hall calls have been registered, the car shall respond to the hall call corresponding to the last direction of car travel. If, after making its stop, a car call is not registered and no other hall calls exist ahead of the car corresponding to its original direction of travel, the doors shall close and immediately reopen in response to the hall call for the opposite direction.
 9. The car shall maintain its original direction at each stop until the doors are fully closed to permit a passenger to register a car call before the car reverses its direction of travel.

C. Independent Service Operation

1. The car operating station shall be equipped with a key-operated switch labeled “IND SER.”
2. Locate the switch in the locked service compartment.
3. When placed in the “on” position the following shall occur:
 - a. Simplex elevator - existing hall call registrations shall extinguish and hall buttons shall remain inoperative as an indication to passengers that there is no elevator service.
4. During Independent Service Operation, the elevator doors shall remain open at any landing until the door close or a car call push button is pressed and maintained until the doors are fully closed.
5. If more than one (1) car call is registered, all registered car calls shall extinguish when the elevator stops in response to the first call.
6. Fire Emergency Recall shall automatically override Independent Service Operation and engage Phase I - Fire Emergency Recall Operation following a period of approximately forty-five (45) seconds.

D. Inspection Service Operation

1. Provide a key operated switch locked service panel that, when turned to the 'ON' position, shall cause the elevator to be removed from service and placed in Inspection Service Operation.
2. Limited operation of the car shall be provided through pressing the Attendant Service up and down push buttons (if provided) or the highest or lowest car call push buttons (if up and down buttons are not provided) in the main car operating panel only.
3. The car shall move at a speed not to exceed 150 feet per minute (0.75 meters per second) as per code with both the hall and car door panels in the closed and locked position.
4. The Inspection Service switch shall be keyed differently than other typical keys used in the operation of the elevator. Keying shall be in accordance with Security Group Classifications as required by applicable code.
5. The top of the elevator car shall be equipped with a control for limited operation of the car during repairs, maintenance and inspection conducted in the hoistway. The transfer of control to the top of car operating device shall cause that device to be the sole means of control for the elevator.
 - a. Visual and audible indication shall be provided on the top of the car when Firefighters' Emergency Operation is initiated.
6. Power door operating equipment shall be rendered inoperative while the car is being operated in the Inspection Service mode with the exception of power closing of the door. The control system shall maintain closing power on the door while the elevator is moving under Inspection Service Operation.
7. The in-car Inspection Service switch shall be rendered ineffective when the top of car inspection control is activated.
8. Machine Room Inspection Operation and Inspection Operation with open door circuits shall be provided in accordance with A17.1 Safety Code, as modified and adopted, where required or allowed by the AHJ.

E. Hoistway Access Operation

1. Provisions shall be made to allow access to the hoistway through the use of hoistway access switches.
2. Operating the access switch shall permit the car to move at a speed not to exceed 150 feet per minute (0.75 meters per second) as per code with the hall and car doors in the open position to obtain access to the top of the car or climb-in pit.
3. The car shall automatically stop motion when the car top is level with the hoistway door sill for access to top of car.
4. The access key switch(es) shall be keyed differently than other typical keys used in the operation of the elevator. Keying shall be in accordance with Security Group Classifications as required by applicable code.
5. Access operation shall be disabled when top of car inspection operation is in effect.

F. Load Weighing Operation

1. A positive means shall be provided to continuously monitor the amount of load being transported by the elevator car.
2. The system shall be used to:
 - a. Preload static motor drives.
 - b. Activate control features that include:

- 1) anti-nuisance operation.
 - 2) load dispatch operation.
 - 3) load dependent non-stop operation where applicable.
3. The anti-nuisance feature shall operate at loads not exceeding 200 lbs., whereas load dispatch and load non-stop shall be set to function at sixty-five percent (65%) of the rated loading capacity for the initial set up and adjustment procedure.

G. Out-of-Service Control Operation

1. Provide an unidentified key-operated switch, engraved with “ON” and “OFF” only, that shall remove the elevator from service when placed in the “ON” position and the car is not in motion. Locate the switch in the service cabinet of the car operating panel.
 - a. When the key-switch is turned to the “ON” position while the elevator is in motion, the car shall proceed to the next call and be removed from service after leveling operations are completed and the doors have opened.
 - b. When engaged, the Out-of-Service Control feature shall cause the car door to remain open and the car call buttons rendered inoperative.
 - c. The elevator shall not respond to hall call assignments from dispatching systems when the Out-of-Service Control feature is active.
2. Firefighters’ Emergency Operation shall override this feature.

H. Firefighters’ Emergency Operation

1. Phase I Emergency Recall Operation shall be provided for each car in accordance with ASME A17.1 code as modified under the applicable local or State law.
2. Each main or auxiliary car operating station shall be provided with an indicator light and warning buzzer, each of which shall become activated whenever Phase I Operation is engaged.
 - a. The warning buzzer shall cease to function once the car has completed the recall sequence and is positioned at the designated recall landing.
 - b. The indicator light shall remain illuminated as long as Phase I Operation is activated.
3. A three-position, key-operated switch shall be provided on the designated recall landing to manually activate Phase I Operation.
 - a. When activated, Phase I Operation shall be arranged so that in order to reset normal service, all cars must first be returned to the designated recall landing, after which the Phase I key-switch must be turned to the “OFF” position.
4. A “Standardized Fire Recall Key” shall be used in accordance with the applicable Chapter of the Public Law.
 - a. Multiple elevators within a group or building that are not affected by the scope of work specified herein, shall be upgraded to the “Standardized Fire Recall Key.”
 - b. The “Standardized Fire Recall Key” shall apply to both Phase I and Phase II Operation.

5. Phase II Emergency Recall In-Car Operation shall be provided for each car in accordance with ASME A17.1 code as modified under local or State law.
 6. Locate controls required for Phase II In-Car Operation in a locked access cabinet in the main car operating panel.
 - a. The cover of the locked access panel shall be engraved as required by local or State law.
 - b. The locked access panel shall contain:
 - 1) Phase II key switch.
 - 2) Fire indicator light.
 - 3) Call cancel push button.
 - 4) Door open push button.
 - 5) Door close push button.
 - 6) Run/Stop switch.
 - 7) Other devices as may be required by local law.
 - c. Engrave the Firefighters' Service operating Instructions on the inside of the locked cabinet door.
- I. Floor Lockout Feature / Keyed Security Control / Car and Hall
1. Provide a two (2) position "on-off" key switch located in the car station adjacent to each floor call button except the primary egress floor.
 - a. Turning the key switch to the "off" (locked out) position shall prevent the registration of a call when the corresponding car call button is pressed.
 2. Provide a two (2) position "on-off" key switch located in each hall call push button station at each floor as directed by the Owner.
 - a. Turning the key switch to the "off" (locked out) position shall prevent the registration of a hall call when the hall call button is pressed.
 3. The key switches shall be individually keyed with a master as directed by the Owner.
 4. The lockout key switches shall be of a material and finish to match the hall push button stations.
 5. Firefighters' Service Operation shall override the Floor Lockout Feature.
- J. Floor Lockout Feature / Keyless - Card Reader Control / Wiring Provisions
1. Wiring: Provide six (6) pair of 20 gauge two (2) flexible conductor low voltage cables with an overall braided shield in the traveling cable of all elevators for card reader interface.
 - a. The cables shall extend from the security interface terminal cabinet in the elevator machine room to behind the elevator return panel above the space allotted for the card reader.
 - b. Terminate the cable to dual screw barrier terminal strips on each end.

2. Card Reader Space: Allocate card reader space in each main car station as directed by the Architect. Provide a flush Lexan lens and mounting provisions for the card reader unit which is provided by others.
3. Interface: For floor programmable card access control in all elevators, provide a pair of terminals for all floors such that application of a momentary dry (no voltage present) contact closure across those terminals by the security system shall enable the selection of the corresponding floor from the floor selector button in the elevator cab.
 - a. Locate the terminals inside an interface terminal cabinet in the elevator machine room.
 - b. Provide all relays required to interface the elevator control system to the momentary dry contact closures provided for under another section of these specifications.
 - c. If applicable, the card reader shall be operable and compatible with the issued card keys used building wide.
 - d. Coordinate system requirements with the manufacturer of the issued card key system.
4. Card Reader "Secure/Bypass" Switch: Provide separate card reader control bypass key switches for each elevator.
 - a. The bypass key switches shall be located in the Lobby Control Panel.
 - b. The bypass key switches shall be a maintained contact type key switch with the key removable in the secure or bypass position.
 - 1) When the key switch is in the secure position, the card reader control mode shall be initiated.
 - 2) When in the bypass position, the card reader control mode shall be bypassed and the elevator shall return to normal operation, permitting free access to any floor.
5. The card reader operation shall bypass floor cut-out switches.
6. Firefighters' Service Operation shall override Floor Lockout Feature.

K. CCTV

1. CCTV Camera Surveillance of Elevators
 - a. A camera shall be installed in a corner-mounted housing, to provide for camera surveillance of all elevators
2. System Interface
 - a. Provide a terminal cabinet in each elevator machine room for elevator CCTV system interface.
3. Traveling Cable
 - a. The card reader interface traveling cable and hoistway wiring shall be one (1), twelve (12) conductor 20 gauge stranded, low voltage cable with an overall braided shield and drain wire.

- b. The CCTV camera interface traveling cable shall be two (2), RG-59U stranded center conductor coax cables and one (1), two (2) conductor 20 gauge stranded, low voltage cable with an overall braided shield and drain wire.
 - c. All security interface traveling cables shall be located in the elevator control traveling cable and shall be isolated from other traveling cables or hoistway wiring used to carry high voltage alternating current circuits.
4. CCTV Camera Installation
- a. The CCTV camera shall be provided by the security contractor and installed by the Elevator Contractor.
 - 1) The security contractor shall provide supervision, wiring details and installation diagrams to the Elevator Contractor.
 - b. The exact CCTV camera locations shall be specified by the Architect.
5. Traveling Cable Installation
- a. Traveling cables for the CCTV camera shall extend from the elevator / security interface terminal cabinet in the elevator machine room to the top of the elevator cab. Provide an excess loop of ten feet (10') of cable at each end.
6. Conduit, Power and Wiring
- a. Provide all conduit, power and wiring required for the installation of the terminal cabinet and traveling cables.
 - b. Provide one (1) 120V duplex unswitched outlet dedicated to security on top of each elevator equipped with CCTV camera.
- L. Car to Lobby Operation
- 1. Provide a key-operated Car-to-Lobby feature.
 - a. Provide a three-position key-operated switch for each elevator in the lobby control panel or at a location as directed by the Architect/Owner to activate the Car-to-Lobby operating feature.
 - 2. When engaged, this feature shall:
 - a. Cause the affected elevator to return non-stop to the lobby after it has discharged all registered car calls.
 - b. Open the door upon arriving at the lobby for approximately ten (10) seconds, after which the elevator shall park out of service with the door closed.
 - c. Maintain door open button function during the interval in which the car is out of service.
 - 3. Returning the key-operated switch in the lobby panel to the “on” position shall restore the car to normal operation.
 - 4. Override the Priority Service feature with Firefighters’ Service in accordance with code and local law.

M. Door Operation

1. Car and hoistway doors shall be arranged to operate in unison without excessive noise or slamming in either direction of travel.
 - a. Door opening speeds of two (2.0) feet per second shall be provided in conjunction with closing speeds of one (1.0) foot per second in accordance with governing code.
 - b. Door operation shall commence as the car stops level at the floor and the machine brake is applied. Pre-door opening shall not be permitted.
2. Where the hoistway door and the car door are mechanically coupled, the kinetic energy of the closing door system shall be based upon the sum of the hoistway and the car door weights, as well as all parts rigidly connected thereto, including the rotational inertia effects of the door operator and the connecting transmission to the door panels.
3. The force necessary to prevent closing of the car and hoistway door from rest shall not exceed thirty (30) lbf. This force shall be measured on the leading edge of the door with the door at any point between one-third (1/3) and two-thirds (2/3) of its travel.
4. Door open and door close time shall be measured between the moment car door operation in either direction begins and the instant at which that cycle is completed.
5. When responding to either a car or corridor call, the amount of time that the elevator door remains stationary in the open position shall be adjustable up to sixty (60) seconds.
 - a. Door open dwell time for a corridor call shall be separate of that for a car call, and in both cases, dwell time shall be canceled whenever the car door protection device is momentarily interrupted by passenger transfers, followed by a reduced door open dwell time of approximately one (1) second (adjustable) after the door protection device is cleared of obstructions.
6. The operation of the door protective device by interruption of one or more infrared light beams (dual or multi-beam non-contact) during the close cycle shall cause the immediate reversing of the doors to the full open position.
7. The door closing cycle shall be arranged so that, in the event the door protective devices become continually obstructed after the normal door open dwell time has expired and following a time interval of approximately thirty (30) seconds (adjustable), a warning tone shall sound and the door closing cycle shall commence at reduced speed and torque per applicable Code requirements.
8. Each car operating station shall be provided with a “door open” and “door close” push button.
 - a. Pressure on the “door open” button shall cause doors in the full open position to remain so and doors engaged in the close cycle to reverse direction and assume the full open position so long as pressure remains applied to the button.
 - b. The “door open” buttons shall also control the open cycle during Phase II - Emergency In-car Operation.
 - c. The “door close” push button shall function on Independent Service, Attendant Service and Phase II - Emergency In-car Operation as well as during normal automatic operations.
9. Repeated attempts by the power door operator to open or close the door at any landing shall be monitored by the control system.

- a. In the event the door fails to cycle properly after a preset (adjustable) number of attempts, the car shall either travel to the next stop or remove itself from service, depending upon whether the malfunction is in the open or close cycle.
10. Each hoistway door shall be provided with an automatic self-closing mechanism arranged so that the door shall close and lock if the car should leave the landing while the hoistway door is unlocked.
11. Car doors shall be arranged to prevent their being manually opened from inside the car unless the elevator is positioned within a floor landing zone.

2.4 MACHINE ROOM EQUIPMENT

A. Controller / Dispatcher

1. The elevators shall have generic microprocessor based controller/dispatchers.
2. Digital logic shall calculate optimum acceleration, deceleration and velocity patterns for the car to follow during each run.
3. Closed-loop distance and velocity feedback shall monitor the actual performance of the elevator car with the desired speed profile.
4. System operating software shall be stored in non-volatile memory.
5. Elevator control relays, contactors, switches, capacitors, resistors, fuses, circuit breakers, overload relays, power supplies, electronic circuit boards, microprocessors, static motor drive units, wiring terminal blocks and related components shall be totally enclosed inside a free-standing metal cabinet with hinged access doors.
 - a. Provide natural or mechanical ventilation for the controller cabinets.
 - b. Equip the vent openings and exhaust fans with filters.
6. Mount equipment to moisture-resistant, noncombustible panels supported from the steel frame.
7. Provide "noise filter" between hoistway wiring and controller/dispatchers to eliminate interference.
8. Optically isolate communication cables between components.
9. Wiring: Wiring on the units, whether factory or field wiring, shall be done in neat order, and all connections shall be made to studs and/or terminals by means of grommets, solderless lugs or similar connections. All wiring shall be copper.
10. Terminal Blocks: Provide terminal blocks with identifying studs on units for connection of board wiring and external wiring.
11. Marking: Identifying symbols or letters shall be permanently marked on or adjacent to each device on the unit, and the marking shall be identical with marking used on the wiring diagrams. In addition to the identifying marks, the ampere rating shall be marked adjacent to all fuse holders.
12. The manufacturer's standard on-board "LCD" display shall be incorporated on the main processor board and/or otherwise incorporated in the controller cabinet. The "LCD" shall be capable of providing alpha-numeric characters to view the operational status of the elevator and/or group functions depending on the application. The display shall provide the user with necessary information for troubleshooting and reprogramming of the basic system parameters.

- a. Where the “LCD” is not an integral part of the controller and troubleshooting/reprogramming requires the use of a separate tool, the tool shall be maintained in the machine room and accessible to service personnel. This tool, along with all technical documentation for the correct use of the tool, shall remain the property of the Owner.
 - b. Password protection of critical programming features is required to prevent accidental changes to life-safety and other non-typical control settings.
 - c. Where a separate dispatch or group control panel is provided, a separate “LCD” display shall be provided to view group functions.
13. In the event diagnostics and monitoring is accomplished via Field Service Tools, provide the required Field Service Tools with related control system appurtenances for diagnostic evaluations, system monitoring and field adjustments.
- a. Provide instructions for proper use of such diagnostic tools and/or equipment with all coding and other operational requirements.
 - b. Maintain and calibrate the diagnostic tools and update the associated instructions and other related documents under the service agreement.
 - 1) Should the agreement be cancelled for any reason by either party, maintenance and updating of diagnostic tools shall be provided to the Owner at the Contractor's cost without the need to purchase or lease additional diagnostic devices, special tools or instructions from the original equipment provider.
 - 2) The Owner may request field and technical instructions be provided by the original installation contractor or manufacturer for proper servicing by other qualified elevator company personnel.
 - 3) The established cost plus profit, as previously specified, shall be applicable for the life of the system.
 - a) If the equipment for fault diagnosis is not completely self-contained within the controllers but requires a separate detachable device, that device shall be furnished to the Owner as part of this installation.
 - b) Such device shall be in possession of and become property of the Owner.
14. Microprocessor Documentation
- a. Provide and/or obtain complete information on systems' design, component parts, installation and/or modification procedures, adjusting procedures and associated computer conceptual logic circuitry and field connection.
 - b. Provide microprocessor upgrading and/or modifications to programs that have been assigned to enhance the operation of the equipment for a period of ten (10) years after project approval.
- B. Machine Beams (Existing)
- 1. Provide additional support beams, angles, plates, bearing plates, blocking steel members, etc., to support new machine, governors, dead end hitches, deflector and overhead sheaves from existing machine beams where applicable.

2. Contractor shall verify adequacy of all existing supports scheduled to be reused and report any potential issues to the Owner.

C. Geared Traction Machine / Sheaves / Brake

1. Provide a worm-gear traction machine with a direct current brake and demountable drive sheave, mounted in proper alignment on a common bedplate.
2. The worm shall be accurately machined from steel and provided with a single end, double race ball bearing thrust.
3. The worm gear shall be made from a phosphor bronze rim, accurately cut, fitted and bolted to a cast iron spider.
4. The drive sheave shall be a demountable casting from the best grade of metal with a Brinell hardness of 215 to 230, and shall be machined with grooves, providing maximum traction with a minimum of rope and sheave wear.
 - a. Roping requirements and type of steel rope used as suspension means shall be engineered by the contractor and manufacturer of the equipment for maximum life of ropes and sheave.
5. Provide means for lubricating the machine.
6. The gear housing shall have a gasketed hole to inspect the gear.
7. Provide machine with an electro-mechanical brake.
 - a. The brake shall be spring applied and electrically released where drum or disk-type brakes are employed.
 - b. Design the brake electro-magnet for quick release and application of the brake.
 - c. The brake lining material shall be non-asbestos.
 - d. The brake pulley or disk shall act as the coupling between the drive motor shaft and the worm shaft.
8. Where feasible - Provide a raised machine arrangement so that the deflector sheave is located above the machine room slab. Provide adequate steel blocking members to support the machine assembly.
9. Span the distance between the car and counterweight with an accurately grooved deflector sheave.
10. Provide sheave guards to prevent ropes from jumping off of the sheave grooves.
11. Provide hoist cable guards at the car and counterweight-drop side of the machine sheave.
 - a. Guards shall cover cables from the point of slab penetration to the point where the hoist cables contact the sheave.
 - b. Guards shall prevent access to cables at pinch points.

D. AC Drive Motor / Geared Applications

1. Provide a vector duty, variable speed, reversible alternating current induction motor with high starting torque and low starting current, rated for 50° C (122° F) during continuous operation, designed for this particular elevator application with 210 starts per hour.
 - a. Provide adequate ventilation of internal stator windings and rotating element to prevent overheating. (Constant velocity fan for constant cooling.)
 - b. Provide thermal overload protection of the stator windings.

2. The hoist motor housing shall have a rigid cast iron stator frame.
 - a. Core plate stator laminations shall be press fit into frame and properly secured.
 - b. Minimum class “F” (or approved equal) insulation shall be used to ensure long-term reliability.
3. The rotating element shall be fabricated from drawn bars machined and fitted in slots with end rings brazed together and shall be dynamically balanced for vibration-free operation. The motor shaft shall be manufactured from high-strength alloy steel for maximum strength.
4. Provide a motor coupling machined for proper fit on motor shaft with slotted keyway and key to properly secure same for standard NEMA mounted construction (foot or footless).
5. Properly align the hoisting motor to the hoisting machine for vibration-free operation.
6. The motor shall have proper labeling in accordance with the requirements of the AHJ.

E. VVVF AC Drive

1. Provide a solid-state, variable voltage, variable frequency (VVVF), three-phase AC hoist motor drive system as part of the microprocessor-based equipment.
 - a. VVVF drive system shall be a low-noise, flux-vector inverter device.
 - b. Include a digital LED readout and touch-key pad to facilitate software parameter adjustments, monitor system operation and display fault codes.
2. The drive shall utilize a three-phase, full wave rectifier and capacitor bank to provide direct current power for solid-state inversion.
3. The inverter shall utilize IGBT power semiconductors and duty cycle modulation fundamental frequency of not less than one kilohertz to synthesize three-phase, variable voltage variable frequency output.
4. The system shall be designed and configured with the following countermeasures for noise generated by the pulse-width modulated (PWM) inverters.
 - a. Control of radiated noise via inverter and/or motor cables.
 - b. Conducted noise through power lines.
 - c. Induction noise and ground noise.
5. Inverter shall be encased in metal and independently grounded.
6. A noise filter for the input power line shall be provided to prevent penetration into radios, wireless equipment and smoke detectors.
7. A three percent (3%) three-phase line reactor shall be provided on the power system rated at the utility voltage input to the drive and sized for the rated drive current.
8. The drive shall:
 - a. Be configured as a complete digital drive system.
 - b. Be totally software configurable.
 - c. Interface with external equipment/signals via either discrete local I/O connections or high speed Local Area Network (LAN).
 - d. Be located within the limits of the control cabinet (where system size allows) or separately mounted in an appropriate chassis with hinged swing-out doors with clearances equal to the cabinet width dimensions.
 - e. Provide programmable linear or S-curve acceleration.

- f. Provide free run or programmable linear or S-curve deceleration.
 - g. Have controlled reversing.
9. Operating and Environmental Conditions:
- a. Have a service factor of one (1.0).
 - b. Rated for continuous duty.
 - c. Humidity – ninety percent (90%) rated humidity non-condensing.
 - d. Cooling - forced air when required.
 - e. Digital display for:
 - 1) Running - output frequency, motor RPM, output current, voltage.
 - 2) Setting - Parameters values for setup and review.
 - 3) Trip - separate message for each trip, last thirty (30) trips to be retained in memory.
10. Protective Features:
- a. Motor overspeed.
 - b. Adjustable current limit.
 - c. Isolated control circuitry.
 - d. Digital display for fault conditions.
 - e. Selectable automatic restart at momentary power loss.
 - f. Manual restart.
 - g. Over/Under Voltage.
 - h. Line to line and line to ground faults.
 - i. Over-temperature.
- F. VVVF AC Drive - Dynamic Braking Module
- 1. Provide a separate dynamic braking module to control overhauling motor speed, reduce hoist motor deceleration time and dissipate regenerated power. The unit shall consist of:
 - a. A resistor bank to absorb power regenerated by the hoist motor.
 - b. A three-phase AC contactor rated for proper HP with overload protection to disconnect the inverter from the hoist motor whenever the elevator is stopped.
- G. Overspeed Governor – PE1
- 1. Provide a speed governor, located overhead, to operate the car safety.
 - a. Maintain the proper tension in the governor rope with a weighted tension sheave located in the pit.
 - 1) Springs used to develop the tension are not acceptable.
 - b. Provide rope grip jaws, designed to clamp the governor rope to actuate the car safety upon a predetermined overspeed downward.
 - 1) The centrifugal type governor shall trip and set rope jaws within sixty (60) degrees of governor sheave rotation after reaching rated tripping speed.

- c. Design the governor rope tripping device so that no appreciable damage to or deformation of the governor rope shall result from the stopping action of the device in operating the car safety.
- d. Provide an electrical governor overspeed protective device which shall remove power from the driving machine motor and brake before or at the application of the safety.
 - 1) The setting for the overspeed switch shall be as prescribed in the ASME A17.1 Safety Code.
 - 2) Locate and enclose the switch to ensure that excess lubrication will not enter the switch enclosure.
 - 3) Overspeed switch shall operate in both direction of travel on systems employing a static power drive unit.
- e. Seal and tag the governor with the running speed, tripping speed and date last tested.
- f. Design the governor to prevent false tripping due to conditions caused by rope dynamics.

H. Overspeed Governor (Reuse) – PE2

- 1. The existing centrifugal overspeed governor shall be refurbished, modified and reused.
- 2. The governor shall be provided with a manually reset electrical safety switch, conforming to ASME A17.1 Safety Code as adopted and/or otherwise amended by the AHJ.
 - 1) When in the tripped position, this switch shall cause all power to be removed from the hoist motor and machine brake.
 - 2) For static power drive applications, this switch shall be designed to operate in both directions of travel.
- 3. Following the refurbishing and modification work, the overspeed governor shall be tested in accordance with applicable sections of the ASME A17.1 Safety Code as adopted and/or otherwise amended by the AHJ.
- 4. Seal and tag the governor with the running speed, tripping speed and date last tested.
- 5. At Contractor's option, a new governor may be substituted and/or provided under the terms of the base Contract.

I. Equipment Isolation

- 1. Provide sound reducing vibration isolation elements at all support points of elevator controller, solid-state motor drives, isolation transformers, reactance units, hoisting motors and machines.
- 2. The elements for controllers, solid-state motor drives and isolation transformers shall be similar to double deflection neoprene-in-shear mounts, as manufactured by Mason Industries, Type ND, with thirty-five hundredths inch (0.35") static deflection under design load ratings.
- 3. Elements between the hoisting machine unitized base and machine support beams shall be similar to triple layer ribbed neoprene pads, separated by appropriate steel shims as manufactured by Mason Industries, Type W pads, at 50 durometer, loaded for 40 psi or approved equal.
- 4. All bolts through isolation elements, where necessary, are to incorporate resilient washers and bushings.

5. Isolation of existing hoisting machine and motor is contingent on the OEM design of the apparatus.

- a. Existing isolation pads shall be replaced with new.

J. Emergency Brake

1. Ascending Car Overspeed Protection Device

- a. Provide a device designed to prevent an ascending elevator from striking the hoistway overhead structure.

- b. The device shall decelerate the car with any load up to the rated capacity by applying an emergency brake.

- 1) The device shall detect an ascending car overspeed condition of not greater than ten percent (10%) higher than the speed that the car governor is set to trip.

- 2) The device, when activated, shall prevent operation of the car until the device is manually reset.

- 3) The device shall meet the requirements of the ASME A17.1 Safety Code as may be modified by the AHJ.

2. Unintended Car Movement Protection Device

- a. Provide a device to prevent unintended car movement away from the landing when the car and hoistway doors are not closed and locked.

- 1) The device shall prevent such movement in the event of failure of:

- a) The electric driving machine motor.

- b) The brake.

- c) The machine shaft or shaft coupling.

- d) Machine gearing.

- e) Control system.

- f) Any component upon which the speed of the car depends.

- g) Suspension ropes and the drive sheave of the traction machine are excluded.

- 2) The device shall prevent operation of the car until the device is manually reset.

- 3) The device shall meet the requirements of the ASME A17.1 Safety Code as may be modified by the AHJ.

3. Where the installation of the Emergency Brake involves the raising of existing hoisting machines or modifications to the machine room slab, the contractor shall provide necessary engineering data, structural review and drawings as part of the submittal process.

2.5 HOISTWAY EQUIPMENT

A. Guide Rails / Inserts / Brackets (Reuse)

1. Car and counterweight guide rails, fishplates, rail brackets, backing support and related attachments shall be inspected to determine if unfavorable conditions exist that diminish the structural integrity of any component.
 - a. In the event substandard conditions are disclosed by means of this inspection, the Contractor shall immediately inform the Consultant as to the exact nature of said problems and then undertake whatever repairs and/or replacements the Consultant may deem appropriate to remedy the situation.
 2. Each stack of guide rails shall be individually examined to determine if excessive compression has occurred from building settlement.
 - a. In the event such conditions are found to exist, each affected stack shall be cut off enough to relieve pressure.
 - b. Jacking bolts shall be provided underneath each stack of both car and counterweight guide rails.
 3. Each stack of guide rails shall be realigned so that total deviation from plumb in any direction does not exceed one-eighth inch (1/8") over the entire length of the hoistway and that DBG measurements never vary more than thirty-thousandths inch (.030").
 4. As required, car guide rails joints shall be individually filled, filed and sanded in order to eliminate minor variations in adjoining machined surfaces.
- B. Counterweight Assembly (Reuse)
1. The existing counterweight assembly shall be refurbished to as new condition and reused.
 2. Individual counterweight frame members shall be inspected for any indication of damage and to determine if the overall assembly is twisted, racked, or otherwise distorted.
 - a. All fastenings between counterweight frame members shall be individually examined, tightened and if necessary renewed.
 - b. In case any of these conditions are found to exist, the Contractor shall immediately inform the Consultant about the exact nature of the problem and undertake whatever corrective action the Consultant may deem appropriate to remedy the situation.
 3. The amount of filler weight placed within the counterweight frame shall be adjusted so the weight of the entire counterweight assembly is equal to that of the renovated elevator car, plus forty to forty-two percent (40-42%) of its rated loading capacity unless otherwise required by a manufacturer where new hoisting machinery is employed.
 - a. Filler weights shall be held securely in place at all times with tie rods passing through holes in both the weights and the counterweight frame with tie rods secured on each end with double lock nut and a cotter pin arrangement.
- C. Roller Guides (Reuse)
1. The existing roller guide assemblies shall be retained and rebuilt for new.
 - a. Replace all worn rollers, bearings, shafts, pivot pins, tensioning devices, shock absorbers and adjustment hardware.
 - b. Realign guide stands to frame mountings.

- c. Reset roller tensioning in conjunction with static balancing of the car enclosure after cab or other apparatus are installed.
 - d. Replace roller guide assemblies as necessary to meet the performance criteria specified herein.
2. Contractor may provide new roller guide assemblies, of equal or greater quality, in lieu of rebuilding the existing, as part of the base bid subject to the approval of the Consultant. Costs associated with replacement shall also be included in the base bid cost.

D. Hoist Ropes

1. Pre-formed traction steel wire rope, specifically constructed for elevator applications, shall be provided for suspension of the elevator car and counterweight assembly.
 - a. Fastenings shall be accomplished by use of individual tapered rope sockets (wedge clamp) with adjustable shackles.
 - b. General design requirements for rope shackles and the method of securing wire rope shall conform with ASME A17.1 elevator safety code as modified by, and/or in addition to codes and standards accepted by the AHJ.
2. New rope shackles shall be provided.
3. Existing hitch plates shall be inspected for wear. Hitch plates with elongated holes or other conditions that may damage shackles shall be replaced with new.
4. Provide anti-spinout as required by applicable code at all shackles where applicable.

E. Governor Rope

1. Pre-formed wire rope specifically constructed for elevator applications, shall be provided for governor ropes.
 - a. Rope shall be traction steel or iron in accordance with OEM design requirements.
 - b. Rope diameter and method of fastening shall be in accordance with ASME A17.1 Safety Code as adopted and/or otherwise modified by the AHJ.

F. Electrical Conduit / Wiring / Traveling Cable

1. Electrical wiring shall be provided.
 - a. All wiring shall be stranded copper conductors, manufactured in compliance with ANSI/ASTM B174-71 and UL 62 requirements, and polyvinyl chloride insulation complying with ETT requirements of UL 62 and Article 400 of the National Electric Code.
 - b. Electrical wiring provided for hoistway interlock shall be of a flame retardant type, capable of withstanding temperatures of at least 392 degrees Fahrenheit. Conductors shall be Type SF or equivalent.
 - c. Each run of electrical conduit or duct shall contain no less than ten percent (10%) spare wires and, in any case, no fewer than two (2) spare wires.
 - d. Crimp-on type wire terminals shall be used where possible.
2. Traveling cable shall be provided.

- a. Each traveling cable shall be provided with a flame and water resistant polyvinyl chloride jacket.
 - b. Electrical wiring shall consist of stranded copper conductors, manufactured in compliance with ANSI/ASTM B174-71 and UL 62 requirements, and polyvinyl chloride insulation complying with ETT requirements of UL 62 and Article 400 of the National Electric Code.
 - c. Each traveling cable shall contain no less than ten percent (10%) spare wires.
 - d. Traveling cable exceeding 100' in length shall be provided with a steel wire rope support strand from which the cable shall be suspended.
 - e. Traveling cable must be contained within an approved electrical conduit to within six feet (6') of the final suspension point in the hoistway.
 - f. Each traveling cable shall be arranged to provide no fewer than six (6) individually shielded pairs of 20 gauge wire and arranged to contain no less than one (1) coaxial cable for CCTV remote monitoring.
 - g. Traveling cable conductors that terminate at a hoistway center box shall be connected to stud blocks provided for that purpose.
 - 1) Each wiring terminal shall be clearly identified by its nomenclature as shown on the "as built" wiring diagrams and solderless, crimp-on type wire terminals shall be used where possible.
 - h. The attachment of a traveling cable to the underside of the elevator car shall be performed so that a minimum loop diameter of thirty times (30x) the cable diameter is provided.
 - i. Pre-hang the cables for at least twenty-four (24) hours with ends suitably weighted to eliminate twisting during operation.
3. Rigidly supported EMT conduit, flexible metal conduit and galvanized steel trough shall be utilized throughout the hoistway.
- a. Both EMT and flexible conduit shall be connected on either end by use of compression fittings and secured in place with metal clamps sized in accordance with the diameter of conduit utilized.
 - 1) Wire or plastic wire ty-raps shall not constitute an acceptable means of fastening.
 - b. The use of flexible metal conduit shall be limited to runs not greater than three feet (3') in length.
 - c. All abandoned or unused electrical conduit shall be removed from the hoistway.
 - d. Existing conduit and wiring duct may be reused if suitable for the application.
 - 1) Reuse of existing conduit/duct shall be at the discretion of the Consultant.

G. Normal and Final Terminal Stopping Devices

- 1. Provide normal terminal stopping devices to stop the car automatically from any speed obtained under normal operation within the top and bottom overtravel, independent of the operating devices, final terminal stopping device and the buffers.
- 2. Provide final terminal stopping devices to stop the car and counterweight automatically from the speed specified within the top clearance and bottom overtravel.

3. The terminal stopping devices shall have rollers with rubber or other approved composition tread to provide silent operation when actuated by the cam fixed to the top of the car.
 - a. Terminal stopping devices that are not mechanically operated (i.e.: magnetic proximity) shall be provided by the manufacturer of the control equipment, intended for use as a terminal limit, and designed for reliable operation in the hoistway environment.
4. Final terminal limits shall be pinned so as to prevent movement after final adjustment where required by the AHJ.

2.6 PIT EQUIPMENT

A. Car and Counterweight Buffer (Reuse)

1. Existing car and counterweight buffers shall be reused.
 - a. Pit channels, related supports and fastenings shall be inspected for damage and to determine if the structural integrity of any component is diminished by the effects of rust or other unfavorable conditions.
 - 1) In the event defects are found, the Contractor shall immediately inform the Consultant and undertake whatever repair and/or replacement the Consultant may deem appropriate.
 - b. Surface rust shall be removed from all reused components.
 - c. Provide a permanent buffer marking plate which indicates the manufacturer's name, identification number, rated impact speed and stroke.
 - d. Provide a permanent data plate in the vicinity of the counterweight buffer indicating the maximum designed counterweight runby in accordance with ASME A17.1 as may be modified by, and/or in addition to codes and standards accepted by the AHJ.
 - e. The buffer shall undergo testing in accordance with ASME A17.1 Code as modified by, and/or in addition to codes and standards accepted by the AHJ.

B. Governor Rope Tension Assembly – PE1

1. Provide a governor rope tension assembly.
 - a. Maintain the proper tension in the governor rope with a weighted tension sheave located in the pit.
 - 1) Springs used to develop the tension are not acceptable.
 - b. The sheave shall be of proper diameter and set directly plumb with the governor rope drop to prevent the rope from pulling off of the sheave at an angle.
 - c. Lubrication fittings shall be provided on the assembly.
 - d. The assembly shall have necessary rope guards to prevent accidental contact of the rope/sheave by service personnel and to prevent the governor rope from jumping off of the sheave.

C. Governor Rope Tension Assembly (Reuse) – PE2

1. The tension sheave assembly shall be washed clean of accumulated grease and oil and inspected for any indication of defective bearings.
 - a. Sheave bearings or oilite bushings which are found to emit unusual noises, appreciable vibration, heat, or which allow the sheave to wobble during operation shall be replaced.
 - b. Surface rust shall be removed from all components.
2. At the Contractor's option, the governor rope tension sheave assembly may be replaced with new in lieu of rebuilding as specified.

D. Pit Stop Switch

1. Where pit depth does not exceed sixty-seven inches (67"), each elevator pit shall be provided with a push/pull or toggle switch that is conspicuously designated "EMERGENCY STOP" and located so as to be readily accessible from the hoistway entrance on the lowest landing served at a height of approximately eighteen inches (18") above the floor.
 - a. This switch shall be arranged to prevent the application of power to the hoist motor and machine brake when placed in the "OFF" position.

2.7 HOISTWAY ENTRANCES

A. Hoistway Entrances (Reuse)

1. Hoistway entrance sills, sill supports, entrance frames, headers and header supports shall be reused and refurbished.
 - a. Hoistway entrances that have become distorted or bent shall be straightened, plumbed, reset to the proper width dimension and reinforced, as necessary.
 - b. Provide 14-gauge steel fascia plates that extend at least the full width of the door and be secured at hanger support and sill with oval head machine screws.
 - 1) Reinforce fascia to allow not more than half an inch (½") of deflection.
 - 2) Provide fascia plates where the clearance between the edge of the loading side of the platform and the inside face of the hoistway enclosure exceeds the code allowed clearance.
 - c. Provide 14-gauge steel toe guards that extend twelve inches (12") below any sill not protected by fascia.
 - 1) The toe guards shall extend the full width of the door and shall return to the hoistway wall at a fifteen (15) degree angle and be firmly fastened.
 - d. Remove oil, dirt and impurities on new and existing apparatus and give a factory coat of rust inhibitive paint to all exposed surfaces of struts, hanger supports, covers, fascias, toe guards, dust covers and other ferrous metal.

B. Slide Type Hoistway Door / New in Existing Frame

1. Provide a new elevator hoistway entrance door reusing existing entrance frame.
2. Each new door shall be as follows:
 - a. Hollow metal construction.
 - b. One and a half (1-1/2) hour fire-rated test approved with required label.
 - c. Manufactured of cold rolled furniture steel.
 - d. Flush design both sides.
 - e. Rigidly reinforced.
 - f. Sound deadened.
3. Where conditions warrant, and where otherwise required by code, equip all hoistway landing doors with one (1) piece full height non-vision wings of material and finish to match hall side of door panels.
4. Provide each door panel with two (2) removable laminated plastic composition guides, arranged to run in existing sill grooves with a minimum clearance.
 - a. The guide mounting shall permit their replacement without removing the door from the hangers.
 - b. A steel fire stop shall be enclosed in each guide.
5. Provide the meeting edge of center opening doors with necessary new continuous rubber astragal bumper strips.
 - a. Astragal shall be relatively inconspicuous when the doors are closed.
 - b. Provide rubber bumpers at the top and bottom of each section of door to stop them at their limit of travel in the opening direction.
6. In multi-speed door arrangements, provisions shall be made to interlock the individual panels so all panels close should the normal door panel relating means fail.
7. Provide a special key so that an authorized person can open any landing door when the car is elsewhere.
 - a. The key hole shall be not less than three-eighths inch (3/8") in diameter and shall be fitted with a stainless steel or bronze ferrule to match related equipment.
8. Finish all door panels to match elevator entrances.
9. Where conditions require, provide necessary new masonry around existing entrance frames to maintain fire rating. Painting or other wall surface decorating will be by Others.

C. Tracks / Hangers / Closers (Reuse)

1. The existing hoistway door hangers and tracks shall be reused and rehabilitated.
2. Roller/hanger assemblies, consisting of the roller and eccentric, shall be cleaned, degreased and adjusted for proper operation.
3. Up-thrust shall be minimized through adjustment of the eccentric roller.
4. Worn rollers and eccentrics shall be replaced where needed.
5. Thoroughly clean the track of all dirt and grease accumulations to provide a smooth surface.

- a. Where track liners are employed, new liners shall be provided.
- 6. Closers at each entrance shall be cleaned and pivot pins lubricated.
 - a. Worn and/or defective sill closers as well as noisy spirators shall be replaced as required to maintain self-closing of the hoistway doors should the elevator leave the floor for any reason with the car door open.
- 7. In multi-speed door arrangements, provisions shall be made to interlock the individual panels so all panels close should the normal door panel relating means fail.

D. Interlocks / Unlocking Devices

- 1. Each set of landing doors shall be provided with a complete electromechanical interlock assembly.
 - a. Each interlock assembly shall consist of:
 - 1) A switch housing with contacts.
 - 2) Lock keeper.
 - 3) Clutch engagement/release subassembly.
 - 4) Associated linkages.
 - b. Arrange the lock so that individual leading door panels (side slide or center opening) are locked when in the closed position.
- 2. Non-typical mounting arrangements for interlocks and/or related mechanisms must receive prior approval from the Consultant.
- 3. Each hoistway door interlock assembly shall be provided with an emergency release mechanism utilizing a drop-leaf type access key at all landings served.
 - a. Each hoistway door shall accommodate manufacturers standard lock release key with escutcheon.
 - 1) The key hole shall be fitted with a metal ferrule that matches the door finish.
 - 2) Drilling key holes in the field will not be accepted.

E. Hoistway Door Bottom Guides / Safety Retainers

- 1. The bottom of each side sliding type hoistway door panel shall be equipped with a minimum of two (2) guiding members.
 - a. Metal mounting angles shall be secured to the integral panel frame structure; and when conditions warrant, additional external metal support plates or angles shall be installed to ensure the integrity of the panel frame is not compromised.
 - b. Guides shall be manufactured of low friction non-metal material with sufficient strength to withstand forces placed on door panels per ASME A17.1 Standards.
 - c. Each guide assembly shall incorporate a steel wear indicator and be so designed to permit sliding member replacements without removal of door panel(s) from top hanger devices.

- d. Panels shall be hung with a maximum vertical clearance of 3/8 inch between top of sill and bottom of panel and the guide shall engage the sill groove by not less than one-quarter (1/4) inch.
2. The bottom of each side sliding type hoistway door panel shall be equipped with a guiding member safety retainer to prevent displacement in the event of primary guide means failure.
 - a. A metal reinforcement (12 gauge stainless or galvanized steel) shall be installed between the two (2) primary guiding members (a.k.a. “Z” bracket).
 - b. The reinforcement shall be designed with a minimum length of eight (8) inches or the maximum possible length that will fit between the primary members and a minimum overall height of two and one-half (2.5) inches secured on the internal face of the door panel. (Hoistway side)
 - c. The retainer shall be set with the supplemental safety angle three-eighths (3/8) inch into the corresponding sill groove; and be capable of preventing displacement of the panel no more than three-quarters (3/4) inch with an applied force of 1125 lbf at right angles over an area twelve (12) inches x twelve (12) inches at the approximate center of the door panel.

2.8 CAR EQUIPMENT / FRAME

A. Car Frame (Reuse)

1. The existing car frame assembly shall be refurbished to as new condition and reused.
2. Individual car frame members, platform isolation framework, door operator support structure, related bracing and hardware shall be inspected for any indication of damage or distortion.
 - a. Where damage is detected, the Contractor shall immediately inform the Consultant and then undertake corrective action deemed appropriate by the Consultant to remedy the condition.
3. Provide new elastomer isolation pads for all existing platforms where pads are presently installed.
4. The car frame, door operator support and related bracing shall be modified or reconfigured as necessary in order to accommodate new cab enclosure and/or master door operating equipment specified herein.
5. The elevator car shall undergo static balancing upon substantial completion of all work described in the project specifications and subsequent to any car interior refinishing or cab replacement work performed in conjunction with the project.

B. Car Platform (Reuse)

1. The existing platform shall be modified to accommodate the new apparatus specified herein.
 - a. Where necessary, the underside of platform shall be refurbished and treated with fire-rated material.

C. Car Safety (Reuse)

1. The existing governor actuated car safety device shall be retained, overhauled and upgraded for current code compliance.
2. Readjust safety for proper operation in accordance with current ASME A17.1 design standards.
3. Check the existing safety operated switch (plank-switch) for proper adjustment and operation.
 - a. Provide a new plank-switch where none currently exists.
4. A new safety shall be provided where the existing is not suitable for reuse due to overall condition or in conjunction with an increase in the elevator speed or full load capacity.

D. Automatic Leveling / Releveling / Positioning Device

1. Equip the elevator with a floor leveling device which shall automatically bring the car to a stop within one-quarter inch (1/4") of any floor for which a stop has been initiated regardless of load or direction of travel.
2. This device shall also provide for releveling which shall be arranged to automatically return the elevator to the floor in the event the elevator should move below or above floor level in excess of one-quarter inch (1/4").
3. This device shall be operative at all floors served and whether the hoistway or car door is open or closed provided there is no interruption of power to the elevator.
4. A positioning device shall be part of the controller microprocessor systems.
 - a. Position determination in the hoistway may be through fixed tape in the hoistway or by sensors fitted on each driving machine to encode and store car movement.
 - b. Design the mechanical features and electrical circuits to permit accurate control and rapid acceleration and retardation without discomfort.
5. Where there are consecutive floors/stops that are short stops, the system shall be capable of distinguishing between the two (2) landing zones without error.
6. All equipment and logic required for leveling system to properly function with short stops shall be included.

E. Top-of-Car Inspection Operating Station

1. An inspection operating station shall be provided on top of the elevator car.
2. This station shall be installed so that the controls are plainly visible and readily accessible from the hoistway entrance without stepping on the car.
3. When the station is operational, all operating devices in the car shall be inoperative.
4. Provide the following control devices and features:
 - a. A push/pull or toggle switch designated "EMERGENCY STOP" shall be arranged so as to prevent the application of power to the hoist motor or machine brake when in the "off" position.
 - b. A toggle switch designated "INSPECTION" and "NORMAL" to activate the top of car Inspection Service Operation.

- c. Push button designated “Up,” “Down” and “Enable” to operate the elevator on Inspection Service (the “Enable” button shall be arranged to operate in conjunction with either the “Up” or “Down” button).
- d. An indicator light and warning buzzer that are subject to activation under Phase I - Fire Emergency Recall Operation.

F. Load Weighing Device

- 1. Provide means to measure the load in the car within an accuracy of \pm four percent (4%) of the elevator capacity.
- 2. Provide one of the following types of devices:
 - a. A device consisting of four (4) strain gauge load cells located at each corner of the car platform and supporting a free floating car platform and cab with summing circuits to calculate the actual load under varying conditions of eccentric loading.
 - b. A strain gauge device located on the crosshead, arranged to measure the deflection of the crosshead and thus determine the load in the car.
 - c. A device consisting of four (4) strain gauge load cells, supporting the weight of the elevator machine with summing circuits to calculate the actual load under varying conditions of load.
 - d. A device to measure the tension in the elevator hoist ropes and thus determine the load in the car.
- 3. Arrange that the output signal from the load weighing device be connected as an input to the signal and motor control systems to pre-torque of the hoisting machine motors where applicable.
- 4. Provide audible and visual signals in connection with the load weighing device when used as an “overload” device.

G. Car Enclosure Work Light / Receptacle

- 1. The top and bottom of each car shall be provided with a permanent lighting fixture and 110 volt GFI receptacle.
- 2. Light control switches shall be located for easy accessibility from the hoistway entrance.
- 3. Where sufficient overhead clearance exists, the car top lighting fixture shall be extended no less than twenty-four inches (24”) above the crosshead member of the car frame.
- 4. Light bulbs shall be guarded so as to prevent breakage or accidental contact.

H. Emergency Exits / Top

- 1. Ensure they operate as per code and have proper electrical contacts and mechanical locks on the exterior of the cab enclosure.

I. Master Door Power Operator System – VVVF/AC

- 1. Provide a heavy-duty master door operator on top of the elevator car enclosure for power opening and closing of the cab and hoistway entrance door panels.
- 2. The operator may be of the pivot/lever or belted linear drive type.
- 3. Operator shall utilize an alternating current motor, controlled by a variable voltage, variable frequency (VVVF) drive and a closed-loop control with programmable operating parameters.

- a. System may incorporate an encoder feedback to monitor positions with a separate speed sensing device or an encoderless closed-loop VVVF-AC control to monitor motor parameters and vary power applied to compensate for load changes.
4. The type of system shall be designated as a high speed operator, designed for door panel opening at an average speed of two (2.0) feet per second and closing at approximately one (1.0) foot per second.
 - a. Reduce the closing speed as required to limit kinetic energy of closing doors to within values permitted by ASME A17.1 as may be adopted and/or modified by the AHJ.
5. The door shall operate smoothly without a slam or abrupt motion in both the opening and closing cycle directions.
 - a. Provide controls to automatically compensate for load changes such as:
 - 1) Wind conditions (stack effect).
 - 2) Use of different weight door panels on multiple landings.
 - 3) Other unique prevailing conditions that could cause variations in operational speeds.
 - b. Provide nudging to limit speed and torque in conjunction with door close signaling/closing and timing devices as permitted by ASME A17.1 as may be adopted and/or modified by the AHJ. Nudging shall be initiated by the signal control system and not from the door protective device.
6. In case of interruption or failure of electric power from any cause, the door operating mechanism shall be so designed that it shall permit emergency manual operation of both the car and corridor doors only when the elevator is located in the floor landing unlocking zone.
 - a. The hoistway door shall continue to be self-locking and self-closing during emergency operation.
 - b. The door operator and/or car door panel shall be equipped with safety switches and electrical controls to prevent operation of the elevator with the door in the open position as per ASME A17.1 Code Standards.
 - c. Provide zone-lock devices as required by ASME A17.1 as may be adopted and/or otherwise modified by the AHJ.
7. Construct all door operating levers of heavy steel or reinforced extruded aluminum members.
8. Belts shall be designed for long life and operate noise free.
9. All components shall be designed for stress and forces imposed on the related parts, linkages and fixed components during normal and emergency operation functions.
 - a. All pivot points, pulleys and motors shall have either ball or roller-type bearings, oilite bronze bushings or other non-metallic bushings of ample size.
10. Provide operating data / data tag permanently attached to the operator as required by applicable code and standards.

J. Car Door Hangers / Tracks / Gate Switch

1. Provide sheave type two-point suspension hangers and track for each car door.
 - a. Sheaves shall be hardened steel, not less than three and one-quarter (3-1/4) inches in diameter with sealed grease packed precision ball bearings.
 - b. The upthrust shall be taken by a roller mounted on the hanger and arranged to ride on the underside of the track.
2. The track shall be of formed cold rolled steel or cold drawn steel and shall be rounded on the track surface to receive the hanger sheaves.
 - a. The track shall be removable and shall not be integral with the header.
3. Provide a gate switch that mounts directly to the car door track.
 - a. The gate switch shall prevent movement of the elevator until such time as it signals the control equipment that the car door has physically closed.

K. Car Door Panel(s)

1. Provide standard one inch (1”) thick, 14-gauge hollow metal flush construction panel(s), reinforced for power operation and insulated for sound deadening.
2. Paint the hoistway side of each panel black and face the cab side with 16-gauge sheet steel matching the existing returns or in selected material and finish as otherwise directed by Owner/Architect.
3. The panels shall have no binder angles and welds shall be continuous, ground smooth and invisible.
4. Drill and reinforce panels for installation of door operator hardware, door protective device, door gibs, etc.
 - a. Provide each door panel with two (2) removable laminated plastic composition guides, arranged to run in the sill grooves with minimum clearance.
 - b. The guide mounting shall permit their replacement without removing the door from the hangers.
5. Provide the meeting edge of center opening doors with necessary continuous rubber astragal bumper strips.
 - a. These strips shall be relatively inconspicuous when the doors are closed.

L. Door Reopening Device / “3D”

1. Provide a combination infrared curtain and 3D door protection system.
2. The door shall be prevented from closing and will reopen when closing if any one of the curtain light rays is interrupted or should an object enter the 3D detection zone.
3. The door shall start to close when the protection system is free of any obstruction.
4. The infrared curtain and 3D zone protective system shall provide:
 - a. Protective curtain field not less than seventy-one inches (71”) above the sill.
 - b. 3D protective zone field not less than sixty-one inches (61”) above the sill.

- c. Accurately positioned infrared lights to conform to the requirements of the applicable handicapped code.
- d. Modular design to permit on board test operation and replacement of all circuit boards without removing the complete unit.
- e. Self-contained, selectable 3D zone timeout feature to allow for closing at nudging speed with audible signal.
- f. Automatic turning-off of the 3D zone in the event of three (3) consecutive 3D triggers.
 - 1) Light curtain shall continue to operate after 3D system timeout.
- g. Selectable control of the 3D zone operation on an “always-on” or “as doors close” basis.
- h. Controls to shut down the elevator when the unit fails to operate properly.
- i. Provide audible and visual notification of pending door close.

2.9 FINISH / MATERIALS / SIGNAGE

A. Material, Finishes and Painting

1. General

- a. Cold-rolled Sheet Steel Sections: ASTM A366, commercial steel, Type B
- b. Rolled Steel Floor Plate: ASTM A786
- c. Steel Supports and Reinforcement: ASTM A36
- d. Aluminum-alloy Rolled Tread Plate: ASTM B632
- e. Aluminum Plate: ASTM B209
- f. Stainless Steel: ASTM A167 Type 302, 304 or 316
- g. Stainless Steel Bars and Shapes: ASTM A276
- h. Stainless Steel Tubes: ASTM A269
- i. Aluminum Extrusions: ASTM B221
- j. Nickel Silver Extrusions: ASTM B155
- k. Bronze Sheet: ASTM B36(36M) alloy UNS No. C2800 (Muntz Metal)
- l. Structural Tubing: ASTM A500
- m. Bolts, Nuts and Washers: ASTM A325 and A490
- n. Laminated / Safety Tempered Glass: ANSI Z97.1

2. Finishes

- a. Stainless Steel
 - 1) Satin Finish: No. 4 satin, long grain.
- b. Sheet Steel:
 - 1) Shop Prime: Factory-applied baked on coat of mineral filler and primer.
 - 2) Finish Paint: Two (2) coats of low sheen baked enamel, color as selected by the Architect.
 - 3) Steel Equipment: Two (2) coats of manufacturer’s standard rust-inhibiting paint to exposed ferrous metal surfaces in both the hoistway and pit that do

not have galvanized, anodized, baked enamel, or special architectural finishes.

3. Painting

- a. Apply two (2) coats of paint to the pit and machine room floor.
- b. Apply two (2) coats of clear lacquer to bronze or similar non-ferrous materials to prevent tarnishing during a period of not less than twelve (12) months after initial acceptance by the Owner or Agent.
- c. Identify all equipment including buffers, car apron, crosshead, safety plank, machine, controller, drive, governor, disconnect switch, etc., by four inch (4") high numerals which shall contrast with the background to which it is applied. The identification shall be either decalcomania or stencil type.
- d. Paint or provide decal-type floor designation not less than four (4) inches high on hoistway doors (hoistway side), fascias and/or walls as required by A17.1 as may be adopted and/or modified by the AHJ. The color of paint used shall contrast with the color of the surface to which it is applied.

B. Designation and Data Plates, Labeling and Signage.

1. Provide an elevator identification plate on or adjacent to each entrance frame where required by the AHJ.
2. Provide floor designation cast plates at each elevator entrance, on both sides of the jamb at a height of sixty (60) inches to the baseline of floor indication.
 - a. Floor number designations and Braille shall be two inches (2") high, three-hundredths inch (0.03") raised and stud mounted.
3. Identify the designated medical emergency services elevator with three inch (3") high international symbol at each elevator entrance on both sides of the jamb.
4. Provide raised designations and Braille markings to the left of the car call and control buttons of the car operating panel(s).
 - a. Designations shall be a minimum of five-eighths inch (5/8") high, three-hundredths inch (0.03") raised and stud mounted.
5. Provide elevators with data and marking plates, labels, signages and refuge space markings complying with A17.1 Elevator Safety Code as may be adopted and/or otherwise modified
6. Architect shall select the designation and data plates from manufacturer's premium line of plates.

2.10 FIXTURES / SIGNAL EQUIPMENT

A. General - Design and Finish

1. The design and location of the hall and car operating and signaling fixtures shall comply with the ADAAG and local requirements of the AHJ.
2. The operating fixtures shall be selected from the manufacturer's premium line of vandal resistant fixtures.

3. Custom designed operating and signaling fixtures shall be as shown on the drawings or as approved by the Owner / Architect.
4. The layout of the fixtures including all associated signage and engraving shall be as approved by the Owner / Architect.
5. Where no special design is shown on the drawings, the buttons shall be as follows:
 - a. Stainless steel vandal resistant convex type as selected by the Owner / Architect from the manufacturer's premium line of push buttons.
 - b. The button shall have a collar with LED call registered light.
6. The faceplates shall be one-eighth inch (1/8") thick No. 4 stainless steel.
7. Mount passenger elevator fixtures with tamperproof screws. The screw/fastener and key switch cylinder finishes shall match faceplate finish.
8. Where key-operated switch and or key operated cylinder locks are furnished in conjunction with any component of the installation, four (4) keys for each individual switch or lock shall be furnished, stamped or permanently tagged to indicate function.
9. All caution signs, pictographs, code mandated instructions and directives shall be engraved and filled with epoxy in code required colors.

B. Main Car Operating Panel

1. Provide a main car operating push button panel on the inside front return panel of the car.
2. Car operating panel shall be incorporated in the swing-front return of the elevator cab.
 - a. Coordination with car front manufacturer shall be the responsibility of the Elevator Contractor.
3. The push buttons shall become individually illuminated as they are pressed and shall extinguish as the calls are answered.
4. The operating panel shall include:
 - a. A call button for each floor served, located not more than forty-eight inches (48") above the cab floor.
 - b. "Door open" / "Door close" buttons.
 - c. "Alarm" button, interfaced with emergency alarm. The alarm button shall illuminate when pressed.
 - d. "Emergency Stop" switch per local law located at thirty-five inches (35") above the cab floor.
 - e. Self-dialing, hands-free emergency communication system actuation button with call acknowledging feature and ASME A17.1. design provisions.
 - f. Three (3) position firefighter key operated switch, call cancel button and illuminated visual/audible signal system with mandated signage engraved per ASME A 17.1 Standards as modified by the AHJ.
5. Locked Firemen's Service cabinet, keyed in accordance with local Code, containing required devices and signals in accordance with ASME A17.1 Standards.
 - a. Automatic opening of the locked cabinet door may be provided with signals initiated by the fire detection and alarm system where approved by the Authority Having Jurisdiction.

6. Provide a locked service cabinet flush mounted and containing the key switches required to operate and maintain the elevator, including, but not limited to:
 - a. Independent service switch.
 - b. Light switch.
 - c. Fan switch.
 - d. G. F. I. duplex receptacle.
 - e. Emergency light test button and indicator.
 - f. Inspection Service Operation key switch.
 - g. Port for hand-held service tool where applicable.
 - h. Dimmer for cab interior lighting.
7. Car operating panel shall incorporate:
 - a. An integral (no separate faceplate) digital L.E.D. floor position indicator.
 - b. Black-filled engraved unit I.D. number or other nomenclature, as approved by Owner.
 - c. A “No Smoking” advisory.
 - d. The rated passenger load capacity in pounds.
8. Where posting of an advisory is permitted by the Governing Authority in lieu of the inspection certificate, engrave the following advisory on the hinged cover of the service cabinet, or where otherwise directed by the Owner.
 - a. Elevator Certificate is On File in Building Management Office.

C. Car Position Indicator

1. The position of the car in the hoistway shall be indicated by the illumination of the position indicator numeral corresponding to the floor at which the car has stopped or is passing.
 - a. Provide two inches (2”) high, ten (10) segment LED type position indicator with direction arrows, integral with the car operating panel.
 - b. Provide Lexan cover lens with hidden support frame behind fixture plate to protect the indicator readout.
 - c. Provide audible floor passing signal per ADA standards where not provided by the elevator signal control.
 - d. Flush mount fixture with cover to match selected car front or car operating panel finish as directed by the Owner.

D. Car Direction Lantern

1. Provide a car riding lantern with visual and audible signal in the edge of the strike and/or return post.
2. The lens shall project a minimum of one-quarter inch (1/4”) and shall be of solid Plexiglas.
3. Use tamperproof screws with surface mount faceplate.
4. Car lantern shall indicate the direction of travel when doors are three-quarters (3/4) open.
5. The unit shall sound once for the “up” direction and twice for the “down” direction.
 - a. Provide an electronic chime with adjustable sound volume.

E. Corridor Push Button Stations / Remove Back Boxes

1. Push button signal fixtures shall be provided on each landing.
2. Each signal fixture shall consist of:
 - a. Up and down illuminating push buttons measuring three-quarters inch (3/4") at their smallest dimension as selected by the Owner.
 - b. A recessed mounting box, electrical conduit and wiring.
3. Intermediate landings shall be provided with fixtures containing two (2) push buttons while terminal landings shall be provided with fixtures containing a single push button.
4. Include firefighter key switch in the main lobby level station or other designated recall landing.
5. Where existing fixtures are located greater than forty-eight inches (48") above the floor:
 - a. The existing back boxes shall be removed.
 - b. New back boxes shall be installed to provide a new centerline to buttons of forty-two inches (42") above the floor.
 - c. Standardize the new centerline on each floor.
6. All cutting, patching, grouting and/or plastering of masonry walls resulting from the removal or installation of corridor fixtures shall be performed by the Contractor so as to maintain the fire rating of the hoistway.
 - a. Finished painting or decorating of wall surfaces shall be by Others.
7. Provide a digital floor position indicator with one inch (1") high numerals at all landings.

F. Hoistway Access Switch

1. Install a cylindrical type keyed switch at top terminal in order to permit the car to be moved at slow speed with the doors open to allow authorized persons to obtain access to the top of the car.
2. Where there is no separate pit access door, a similar switch shall be installed at the lowest landing in order to permit the car to be moved away from the landing with the doors open in order to gain access to the pit.
3. Locate the switch in the hall call push button station at the top and bottom terminal landings where required if allowed by the Authority Having Jurisdiction.
4. This switch is to be of the continuous pressure spring-return type and shall be operated by a cylinder type lock having not less than a five (5) pin or five (5) disc combination with the key removable only in the "OFF" position.
 - a. The lock shall not be operable by any key which operates locks or devices used for other purposes in the building and shall be available to and used only by inspectors, maintenance men and repairmen in accordance with A17.1 applicable Security Group.

G. Lobby Control Panel

1. Provide a Lobby Control Panel for elevators as directed by the Architect.
2. Provide stainless steel faceplate with tamperproof screws.

3. The panel shall include:
 - a. Two inch(2”) high LCD car position and travel direction indicators.
 - b. Master intercom station / telephone.
 - c. Three (3) position (on/car to lobby/off) switches.
 - d. “Car at the designated floor with its doors open” indicator.
 - e. System trouble indications.
 - f. Car call floor lockout switches.
 - g. Floor lockout switches as herein further specified.

2.11 CAR ENCLOSURES

A. Elevator Car Enclosure(s) and the Five Percent (5%) Rule:

1. In accordance with A17.1, Section 8.7, as adopted and/or modified by the AHJ, entitled “Alterations,” where a new or remodeled elevator car enclosure is included in the base scope of work, the Contractor shall, within thirty (30) days after execution of the contract, weigh the elevator, or one (1) elevator of each group of elevators included in the base scope of work, to determine the present deadweight of the platform/sling/cab assembly.
2. The Contractor shall, when necessary, weigh the interior materials of a single cab to better estimate the total existing weight of existing materials being removed as part of the alteration.
3. The Contractor shall make every effort to provide accurate weight measurements while taking into consideration all weights that may present themselves at the time the measurement is taken such as compensation, compensating sheave, hoist ropes and traveling cables that may affect the measurement of the assembly itself.
4. The Contractor shall evaluate the actual counterbalance percentage for each sample elevator to identify prevailing conditions.
5. Measurements of actual cab weight shall be compared to the original deadweight of the car as stamped on the crosshead data tag.
6. Where no data tag exists, the Contractor shall make every effort to determine the original weight of the platform/sling/cab through calculations based on the current weight of the counterweight assembly and the verified percent of full load counterbalance.
7. The amount of weight that may be added to the car, so as to remain within the limits of the “Five Percent (5%) Rule”, shall be calculated based on the following:
 - a. $(\text{Original Deadweight} + \text{Capacity}) \times (0.05) = \text{Maximum Additional Weight Allowed}$
8. The Contractor shall document and notify the Owner and Consultant of the results of the measurements taken and what weight, if any, can be added or needs to be removed from the cab in order to maintain compliance with the Five Percent (5%) Rule.
9. The Contractor shall work diligently with the Owner and/or Owner’s Representative and/or Architect as well as the manufacturer of the car enclosure to minimize additional weights of the new or remodeled car enclosure so as to maintain compliance with the Five Percent (5%) Rule.
10. Contractor shall be responsible for proper adjustment of the counterbalance of the system, including the static balance of the platform/sling/car enclosure, upon completion of the car interior work.
11. Costs associated with this work shall be included in the base modernization price.

12. Provide a new data tag on the crosshead of the elevator indicating the new deadweight, the current percent counterbalance and the date of the alteration.

B. Elevator Cab / Refurbish – Base Bid

1. Clean and polish existing flooring replacing any broken tiles with new of the same style and pattern, approved by architect/owner.
2. Replace car door entrance saddle using an extruded aluminum sill with necessary cradle supports.
3. Install new low voltage, low heat, recessed downlights in the cab dome to maximize inside floor-to-ceiling clearance.
 - a. Minimum of four (4) to six (6) lighting fixtures with clear Halo lens trim and Lexan shields. Must be anti-ligature.
4. Resurface walls and doors to cover or patch any existing holes and finish with two (2) coats of selected rust inhibiting paint.
5. Refinish interior ceiling with two (2) coats of white, rust inhibiting paint.
6. Provisions for security CCTV camera specified herein.
7. Installation of rear wall handrail thirty-two (32) inches above the finished floor with three (3) points of attachment designed for interior access servicing and support plates on the exterior of the enclosure. Handrail and all associated hardware must be anti-ligature.
8. Installation of grills over the vents at the ceiling for anti-ligature protection of the vents. Grills should be painted to match.
9. Installation of anti-ligature vented base grills to cover existing vent holes. Grills should be painted to match.

C. Elevator Cab / Refurbish – Alternate No.1

1. Replace finished top flooring cover issuing a commercial grade no wax LVT floor tile over new marine grade sub floor.
2. Replace car door entrance saddle using an extruded aluminum sill with necessary cradle supports.
3. Install new anti-ligature Stainless Steel #4 ceiling with low voltage, low heat, recessed downlights in the cab dome to maximize inside floor-to-ceiling clearance.
 - a. Minimum of four (4) to six (6) lighting fixtures with clear Halo lens trim and Lexan shields. Must be anti-ligature.
4. Resurface walls and doors to cover or patch any existing holes and finish with two (2) coats of selected rust inhibiting paint.
5. Install new Stainless Steel #4 wall panels on side and rear of cab.
6. Provisions for security CCTV camera specified herein.
7. Installation of rear wall handrail thirty-two (32) inches above the finished floor with three (3) points of attachment designed for interior access servicing and support plates on the exterior of the enclosure. Handrail and all associated hardware must be anti-ligature.
8. Installation of grills over the vents at the ceiling for anti-ligature protection of the vents. Grills should be painted to match.
9. Installation of anti-ligature vented base grills to cover existing vent holes. Grills should be painted to match.

D. Elevator Cab Enclosure Fan

1. Provide an exhaust type two-speed fan unit with cover grill, mounting accessories and necessary cab enclosure modifications. Grill cover into elevator cab must be anti-ligature.
 - a. Fan unit shall include self-lubricating motor with housing rubber mounted for sound vibration isolation.
2. Provide a key switch in the elevator cab enclosure for control of fan unit.
3. Provide necessary wiring and approved conduit to properly connect fan unit with power source and control key switch.

2.12 EMERGENCY LIGHTING / COMMUNICATIONS / SIGNALING

A. Battery Back Up Emergency Lighting Fixture and Alarm

1. Provide a self-powered emergency light unit.
 - a. Arrange two (2) of the cab light fixtures to operate as the emergency light system.
 - b. Where cab lighting is utilized for emergency lighting, Contractor shall coordinate the battery back-up equipment so that it is compatible with the type of cab lighting specified by the Owner or Architect.
2. Provide a car-mounted battery unit including solid-state charger and testing means enclosed in common metal container.
 - a. The battery shall be rechargeable nickel cadmium with a ten (10) year minimum life expectancy. Mount the power pack on the top of the car.
 - b. Provide a six inch (6") diameter alarm bell mounted directly to the battery/charger unit and connected to sound when any alarm push button or stop switch in the car enclosure is operated.
 - c. The bell shall be configured to operate from power supplied by the building emergency power generator. The bell shall produce a sound output of between 80-90 dBa (measured from a distance of ten feet [10']) mounted on top of the elevator car.
 - 1) Activation of this bell shall be controlled by the stop switch and alarm button in the car operating station.
 - 2) The alarm button shall illuminate when pressed.
3. Where required by Code for the specific application, the unit shall provide mechanical ventilation for at least one (1) hour.
4. The operation shall be completely automatic upon failure of normal power supply.
5. Unit shall be connected to normal power supply for car lights and arranged to be energized at all times so it automatically recharges battery after use.

B. Emergency Voice Communication / Telephone

1. A hands-free emergency voice communication system shall be furnished in each car mounted as an integral part of the car operating panel.

- a. Necessary wires shall be included in the car traveling cable and shall consist of a minimum of one shielded pair of 20AWG conductors.
 - b. 120V power shall be provided to power the hands-free device.
2. The telephone shall be equipped with an auto-dialer and illuminating indicator which shall illuminate when a call has been placed and begin to flash when the call has been answered.
 - a. Engraving shall be provided next to the indicator which says, "When lit help is on the way".
 3. In addition to the standard "Alarm" button, a separate activation button shall be provided on the car operating panel to initiate the emergency telephone and place a call.
 - a. The telephone must not shut off if the activating button is pushed more than once.
 - b. The telephone shall transmit a pre-recorded location message only when requested by the operator and be provided with an adjustable call time which can be extended on demand by the operator.
 - c. Once two-way communication has been established, voice prompts shall be provided which instruct the operator on how to activate these functions as well as alerting the operator when a call is being attempted from another elevator in the building.
 4. The system shall be compatible with ring down equipment and PBX switchboards.
 5. The system shall be capable of serving as the audio output for an external voice annunciation system.
 - a. Conversation levels shall measure 60 dbA or higher and measure 10 dbA above ambient noise levels.
 - b. Each device shall be provided with a self-diagnostic capability in order to automatically alert building personnel should an operational problem be detected.
 6. The phone shall be able to:
 - a. Receive incoming calls from any On-Site Rescue Station (when provided or required).
 - b. Receive incoming calls from other off-site locations via the public telephone system.
 - c. Acknowledge incoming calls and automatically establishing hands-free two way communications.
 - 1) If no On-Site Rescue Station is provided, each hands-free device shall have built in line consolidation which will allow up to six (6) elevators to be called individually from outside the building over a single telephone line and up to eighty (80) elevators if an On-Site Rescue Station is provided.
 7. The emergency elevator communication system shall require a maximum of one (1) telephone line.
 - a. The system must provide line sharing capability to eliminate the need for a dedicated telephone line.

- b. The line sharing function must ensure that the emergency telephones always receive dialing priority even if the line is in use and that the emergency telephones can be called into from an off-site location.
- 8. The system shall provide its own four-hour backup power supply in case of a loss of regular AC power.
- 9. The system must provide capability for building personnel to call into elevators and determine the charge state of any backup batteries provided for the emergency telephones.
- 10. Pushing the activation button in any of the elevator car stations will cause any on-site Rescue Station (where provided or required) or security telephone to ring.
 - a. If the on-site call is not picked up within thirty (30) seconds, the call will be automatically forwarded to a twenty-four (24) hour off-site monitoring service.
 - b. The arrangements and costs of the off-site monitoring and telephone line shall be by others.
- 11. All connections from the junction box to the telephone system shall be done by the Elevator Contractor where existing provisions can be reused.
- 12. New telephone lines, where required, shall be provided and interfaced by others.

C. Central Exchange Communication System / Intercom

- 1. Provide an ADA compatible, hands-free intercommunication system for all elevators for two-way, multi-path communication between the elevator car stations and master stations using a central exchange design system.
- 2. The communication system shall include:
 - a. A car station in each elevator.
 - b. A master station in each machine room to communicate with the central and satellite monitor panels, and with each car within its group.
 - c. A master station in the Security Room to communicate with all stations in the system.
 - d. A master station at the Lobby Control Panel.
- 3. The car station shall have a loudspeaker and a microphone to provide hands-free communication. The station shall be installed behind the car operating panel.
- 4. Master stations shall include:
 - a. Selector push buttons.
 - b. Annunciator lights for each connected station.
 - c. Speaker/microphone.
 - d. Volume control and function buttons.
- 5. The master stations shall communicate with other master stations and any elevator in that group.
- 6. A call shall be placed from the elevator car station by pressing the emergency call or alarm button.
 - a. This action shall cause the lamp in the corresponding button of all the designated master stations to flash and an intermittent tone to be heard.
 - b. When the incoming call is answered, the flashing light shall go to a steady condition.

- c. Disconnection of a call is simply done by depressing the designated car button once.
 - d. If a call request is placed during a conversation, it shall be indicated by a flashing light and short tone of every designated master station.
 - e. When the original conversation is completed, the normal intermittent tone shall resume.
7. A master station shall be connected to any of its designated car stations by depressing the corresponding call button.
- a. The lamp in the button shall be illuminated while the button is depressed.
 - b. In the car station an audible tone shall be emitted and immediate communication is established.
 - c. The call shall be ended by depressing the button a second time, disconnecting the circuit.
 - d. The master stations shall call any other master station by depressing the corresponding call button.
 - e. The button shall lock in its down position and the lamp shall be lit with a steady light.
 - f. At the called master station, a short tone shall be sent out and the lamp in the button corresponding to the “calling” party shall be lit.
 - g. After the tone, immediate communication is established.
8. On all non-called master stations, the lamps corresponding to the calling and called stations shall be illuminated as an indication that those stations are busy.
9. Provide all power supplies, wire, conduit, fittings, etc., for both systems.
10. Location of the stations, in the specified rooms or areas, shall be directed by the Owner.
11. The intercom system shall include the following features:
- a. Test button and monitoring features to verify audio circuit path.
 - b. All call buttons to initiate a call to all cars in the systems.
 - c. Priority button in the remote monitoring panel stations.
 - d. Visual acknowledgment and engraving for the hearing impaired.
12. Provide a battery backup power supply for the intercom capable of providing sufficient power to operate the complete system for a minimum of four (4) hours.
- D. Firefighters’ Two-Way Telephone Communications System – As Required by AHJ
- 1. Provide a complete two-way telephone communications system for point-to-point communications between authorized personnel.
 - 2. Provide firefighter telephone jack in the car operating panel, hall push button stations and / or elevator machine room in accordance with the requirements of the local authorities. The box shall be fitted with a flush mounted door having hairline joints.
 - 3. Connection devices (jacks) and all associated wiring shall be provided by the elevator Contractor as part of the base bid.
 - 4. The handsets shall be self-powered and not require an external power source for operation.
- E. Life Safety System
- 1. Install Life Safety System speaker in each elevator cab.

2. Provide all necessary wiring and interfacing between the elevator system and the Life Safety System as required.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspection

1. Study the Contract Documents with regard to the work as specified and required so as to ensure its completeness.
2. Examine surface and conditions to which this work is to be attached or applied and notify the Owner in writing if conditions or surfaces are detrimental to the proper and expeditious installation of the work. Starting the work shall imply acceptance of the surfaces and conditions to perform the work as specified.
3. Verify, by measurements at the job site, dimensions affecting the work. Bring field dimensions which are at variance with those on the accepted shop drawings to the attention of the Owner. Obtain the decision regarding corrective measures before the start of fabrication of items affected.
4. Cooperate in the coordination and scheduling of the work of this section with the work of other sections so as not to delay job progress.

3.2 INSTALLATION / PROJECT PHASING

A. Installation

1. Modernize the elevators, using skilled personnel in strict accordance with the final accepted shop drawings and other submittals.
2. Comply with the code, manufacturer's instructions and recommendations.
3. Coordinate work with the work of other building functions for proper time and sequence to avoid delays and to ensure right-of-way of system. Use lines and levels to ensure dimensional coordination of the work.
4. Accurately and rigidly secure supporting elements within the shaftways to the encountered construction within the tolerance established.
5. Provide and install motor, switch, control, safety and maintenance and operating devices in strict accordance with the submitted wiring diagrams and applicable codes and regulations having jurisdiction.
6. Ensure sill-to-sill running clearances do not exceed one and one-quarter inches (1-1/4") at all landings served.
7. Arrange door tracks and sheaves so that no metal-to-metal contact exists.
8. Reinforce hoistway fascias to allow not more than half an inch (1/2") of deflection.
9. Isolate cab fan from canopy to minimize vibration and noise.
10. Remove oil, dirt and impurities and give a factory coat of rust inhibitive paint to all exposed surfaces of struts, hanger supports, covers, fascias, toe guards, dust covers and other ferrous metal.
11. Prehang traveling cables for at least twenty-four (24) hours with ends suitably weighted to eliminate twisting after installation.

12. After installation, touch up in the field, surfaces of shop primed elements which have become scratched or damaged.
13. Lubricate operating parts of system as recommended by the manufacturer.

B. Project Phasing

1. Phase I - Final design development and contractors' preliminary work procedures to be completed within four (4) weeks from date of contract award.
 - a. Prevailing conditions review and layout.
 - b. Selection meeting for aesthetic design and finishes with Owners' designee.
 - c. Filing for required permits or other governing authorities work procedure requirements.
2. Phase II - Submittal approvals and confirmations shall be completed within eight (8) weeks from date of contract award.
 - a. Selection confirmations.
 - b. Manufacturer's shop drawings applicable, i.e., fixtures, cab, machine room layouts, doors, etc.
 - c. Engineering data acknowledgment applicable, i.e., power, heat, structural loads.
 - d. Delivery dates for major component suppliers, i.e., controls, machinery, fixtures, cabs, etc.
 - e. Posting of permits or other governing agency authorizations to proceed.
 - f. Proposed work implementation schedule based on the aforementioned procedures/confirmations.
3. Phase III - Mobilization of Final Design Approvals
 - a. Revision confirmations. (Equipment, etc.)
 - b. Preliminary work procedures.
 - c. Schedule confirmations.
4. Phase IV – Implementation
 - a. Modernize one (1) elevator at a time utilizing one (1) full-time on-site team of elevator mechanics.
5. Contractor shall provide a project schedule as part of the Bid based on the following:
 - a. Include three (3) days of simulated operation, with or without door operation, while not allowing passenger use.
 - b. Consultant punch list inspection report shall be performed after acceptance testing by the AHJ for each individual elevator.
 - c. Contractor shall complete all punch list items issued by both the AJH and the Consultant prior to turn-over for beneficial use by the Owner and removal of the next elevator for modernization.

3.3 FIELD QUALITY CONTROL

A. Inspection and Testing

1. Upon completion of each work phase or individual elevator specified herein, the Contractor shall, at its own expense, arrange and assist with inspection and testing as may be required by the A.H.J. in order to secure a permit to operate.

B. Substantial Completion

1. The work shall be deemed “Substantially Complete” for an individual unit or group of units when, in the opinion of the Consultant, the unit is complete, such that there are no material and substantial variations from the Contract Documents, and the unit is fit for its intended purpose.
2. Governing authority testing shall be completed and approved in conjunction with inspection for operation of the unit; a certificate of operation or other required documentation issued; and remaining items mandated for final acceptance completion are limited to minor punch list work not incorporating any life safety deficiencies.
3. The issuance of a substantial completion notification shall not relieve the Contractor from its obligations hereunder to complete the work.
4. Final completion cannot be achieved until all deliverables, including but not limited to training, spare parts, manuals, and other documentation requirements, have been completed.

C. Contractor’s Superintendent

1. The Contractor shall assign a competent project superintendent during the work progress and any necessary assistant, all satisfactory to the Owner. The superintendent shall represent the Contractor and all instructions given to him shall be as binding as if given to the Contractor.

3.4 PROTECTION / CLEANING

A. Protection and Cleaning

1. Adequately protect surfaces against accumulation of paint, mortar, mastic and disfiguration or discoloration and damage during shipment and installation.
2. Upon completion, remove protection from finished surfaces and thoroughly clean and polish surfaces with due regard to the type of material. Work shall be free from discoloration, scratches, dents and other surface defects.
3. The finished installation shall be free of defects.
4. Before final completion and acceptance, repair and/or replace defective work, to the satisfaction of the Owner, at no additional cost.
5. Remove tools, equipment and surplus materials from the site.

3.5 DEMONSTRATION

A. Performance and Operating Requirements

1. Passenger elevators shall be adjusted to meet the following performance requirements:

- a. Speed: within \pm three percent (3%) in both directions of travel under any loading condition.
- b. Leveling: within \pm one-quarter inch (1/4") as measured between the car entrance threshold and the landing sill on any given floor under any loading condition.
- c. Typical Floor-to-Floor Time: (Recorded from the doors start to close on one floor until they are three-quarters [3/4] open at the next floor) under various loading conditions.

100 FPM Passenger Elevators 15.0 – 16.0 seconds.

- d. Door Operating Times

Door Type	Opening	Closing
48" Side-Opening	2.8 – 3.4 sec.	5.5 – 6.5 sec.

- e. Door dwell time for hall calls: 4.0 sec with Advance lantern signals.
- f. Door dwell time for hall calls: 5.0 sec without Advance lantern signals.
- g. Door dwell time for car calls: 3.0 seconds.
- h. Reduced non-interference dwell time: 1.0 seconds.

- 2. Maintain the following ride quality requirements for the passenger elevators:

- a. Noise levels inside the car shall not exceed the following:
 - 1) Car at rest with doors closed and fan off - 40 dba.
 - 2) Car at rest with doors closed, fan running - 55 dba.
 - 3) Car running at high speed, fan off - 50 dba.
 - 4) Door in operation - 60 dba.
- b. Vertical accelerations shall not exceed 14 milli-g and horizontal accelerations shall not exceed 25 milli-g.
 - 1) The accelerometer used for this testing shall be capable of measuring and recording acceleration to nearest 0.01 m/s² (1 milli-g) in the range of 0-2 m/s² over a frequency range from 0-80 Hz with ISO 8041 filter weights applied. Accelerometer should provide contact with the floor similar to foot pressure, 60 kPA (8.7psi).
- c. The amplitude of acceleration and deceleration shall not exceed 2.6 - 2.8 ft./sec² for geared and MRL traction, and 3.5 - 4 ft./sec² for gearless traction elevators.
- d. The maximum jerk rate shall be one and a half (1.5) to two (2.0) times the acceleration and deceleration.
- e. The maximum velocity which the elevator achieves in either direction of travel while operating under load conditions that vary between empty car and full rated load shall be within \pm three percent (3%) of the rated speed.

B. Acceptance Testing

- 1. Comply with the requirements of Division 01.

2. The Contractor shall provide at least five (5) days prior written notice to the Owner and Consultant regarding the exact date on which work specified in the Contract Documents will reach completion on any single unit of vertical transportation equipment.
3. In addition to conducting whatever testing procedures may be required by local inspecting authorities in order to gain approval of the completed work, and before seeking approval of said work by the Owner, the Contractor shall perform certain other tests in the presence of the Consultant.
4. The Contractor shall provide test instruments, test weights, and qualified field labor as required to safely operate the unit under load conditions that vary from empty to full rated load and, in so doing, to successfully demonstrate compliance with applicable performance standards set forth in the project specifications with regard to:
 - a. Operation of safety devices.
 - b. Sustained high-speed velocity of the elevator in either direction of travel.
 - c. Brake-to-brake running time and floor-to-floor time between adjacent floors.
 - d. Floor leveling accuracy.
 - e. Door opening/closing and dwell times.
 - f. Ride quality inside the elevator car.
 - g. Communication system.
 - h. Load settings at which anti-nuisance, load dispatch, and load non-stop features are activated.
5. Upon completion of work specified in the Contract Documents on the last car in any group of elevators, and in conjunction with the aforementioned testing procedures, the Contractor shall carry out additional testing of group dispatch/supervisory control features in the presence of the Consultant.
6. The Contractor shall provide test instruments and qualified field labor as required to successfully demonstrate:
 - a. Firefighter and independent service operations.
 - b. Restricted access security features.
 - c. Floor parking assignments.
 - d. Up/down peak operation.
7. After hour tests of systems such as emergency generators, fire service, and security systems shall be conducted at no extra cost to the Owner.

END OF SPECIFICATION

SECTION 220010 – PLUMBING PROVISIONS**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. All contract documents including drawings, alternates, addenda and modifications and general provisions of the Contract, including General and Supplementary Conditions and all other Division Specification Sections, apply to work of this section. All preceding and following sections of this specification division are applicable to the Plumbing Contractor, all sub-contractors, and all material suppliers.

1.2. SCOPE OF WORK

- A. This DIVISION requires the furnishing and installing of complete functioning Plumbing systems, and each element thereof, as specified or indicated on Drawings or reasonably inferred, including every article, device or accessory reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the Work include materials, labor, supervision, supplies, equipment, transportation, and utilities.
- B. In case of an inconsistency between the Drawings and Specifications or within either document, the better quality or the greater quantity of work shall be provided in accordance with the Architect or Engineer's interpretation.
- C. Refer to Architectural, Structural and Electrical Drawings and all other contract documents and to relevant equipment drawings and shop drawings to determine the extent of clear spaces and make all offsets required to clear equipment, beams and other structural members to facilitate concealing piping and ductwork in the manner anticipated in the design.

1.3. SPECIFICATION FORM AND DEFINITIONS

- A. The Engineer indicated in these specifications is Pearson Kent McKinley Raaf Engineers LLC. 13300 W 98th Street, Lenexa, KS 66215, PHONE 913-492-2400, EMAIL admin@pkmreng.com.
- B. Contractor, wherever used in these specifications, shall mean the Company that enters into contract with the Owner to perform this section of work.
- C. When a word, such as "proper", "satisfactory", "equivalent", and "as directed", is used, it requires the Architect-Engineer's review.
- D. "PROVIDE" means to supply, purchase, transport, place, erect, connect, test, and turn over to Owner, complete and ready for regular operation, the particular Work referred to.
- E. "INSTALL" means to join, unite, fasten, link, attach, set up, or otherwise connect together before testing and turning over to Owner, complete and ready for regular operation, the particular Work referred to.
- F. "FURNISH" means to supply all materials, labor, equipment, testing apparatus, controls, tests, accessories, and all other items customarily required for the proper and complete application for the particular Work referred to.
- G. "WIRING" means the inclusion of all raceways, fittings, conductors, connectors, tape, junction and outlet boxes, connections, splices, and all other items necessary and/or required in connection with such Work.
- H. "CONDUIT" means the inclusion of all fittings, hangers, supports, sleeves, etc.
- I. "AS DIRECTED" means as directed by the Architect/Engineer, or his representative.
- J. "CONCEALED" means embedded in masonry or other construction, installed behind wall furring or within double partitions, or installed above hung ceilings.

1.4. QUALIFICATIONS

- A. The contractors responsible for work under this section shall have completed a job of similar scope and magnitude within the last 3 years. The contractors shall employ an experienced, competent and adequate work force licensed in their specific trade and properly supervised at all times. Unlicensed workers and general laborers shall be adequately supervised to insure competent and

quality work and workmanship required by this contract and all other regulations, codes and practices. At all times the contractors shall comply with all applicable local, state and federal guidelines, practices and regulations. Contractor may be required to submit a statement of qualifications upon request before any final approval and selection. Failure to be able to comply with these requirements is suitable reason for rejection of a bid.

1.5. LOCAL CONDITIONS

- A. The contractor shall visit the site and determine the existing local conditions affecting the work required. Failure to determine site conditions or nature of existing or new construction will not be considered a basis for granting additional compensation.

1.6. CONTRACT CHANGES

- A. Changes or deviations from the contract documents; including those for extra or additional work must be submitted in writing for review of Architect-Engineer. No verbal change orders will be recognized.

1.7. LOCATIONS AND INTERFERENCES

- A. Locations of equipment, piping and other plumbing work are indicated diagrammatically by the plumbing drawings. The Contractor shall determine the exact locations on site, subject to structural conditions, work of other Contractors, and access requirements for installation and maintenance to approval of Architect-Engineer. Provide additional piping and ductwork offsets as required at no additional cost.
- B. Study and become familiar with the contract drawings of other trades and in particular the general construction plans and details in order to obtain necessary information for figuring installation. Cooperate with other contractors and install work in such a way as to avoid interference with their work. Minor deviations, not affecting design characteristics, performance or space limitation may be permitted if reviewed prior to installation by Architect-Engineer.
- C. Any pipe, ductwork, equipment, apparatus, appliance or other item interfering with proper placement of other work as indicated on drawings, specified, or required, shall be removed, relocated and reconnected without extra cost. Damage to other work caused by this Contractor, the Subcontractor, or workers shall be restored as specified for new work.
- D. Do not scale mechanical, plumbing and electrical drawings for dimensions. Contractor shall accurately layout work from the dimensions indicted on the Architectural drawings unless they are found to be in error.

1.8. PERFORMANCE

- A. Final acceptance of work shall be subject to the condition that all systems, equipment, apparatus and appliances operate satisfactorily as designed and intended. Work shall include required adjustment of systems and control equipment installed under this specification division.
- B. The Contractor warrants to the Owner and Architect-Engineer the quality of materials, equipment, workmanship and operation of equipment provided under this specification division for a period of one year from and after completion of building and acceptance of plumbing systems by Owner.

1.9. WARRANTY

- A. The Contractor warrants to the Owner and Architect-Engineer that upon notice from them within a one year warranty period following date of acceptance, that all defects that have appeared in materials and/or workmanship, will be promptly corrected to original condition required by contract documents at Contractor's expense.
- B. The above warranty shall not supersede any separately stated warranty or other requirements required by law or by these specifications.

1.10. ALTERNATES

- A. Refer to General Requirements for descriptions of any alternates that may be included.

1.11. MATERIALS, EQUIPMENT AND SUBSTITUTIONS

- A. The intent of these specifications is to allow ample opportunity for Contractor to use his ingenuity and abilities to perform the work to his and the Owner's best advantage, and to permit maximum competition in bidding on standards of materials and equipment required.
- B. Material and equipment installed under this contract shall be first class quality, new, unused and without damage.
- C. In general, these specifications identify required materials and equipment by naming one or more manufacturer's brand, model, catalog number and/or other identification. The first named manufacturer or product is used as the basis for design; other manufacturers named must furnish products consistent with specifications of first named product as determined by Engineer. Base bid proposal shall be based only on materials and equipment by manufacturers named, except as hereinafter provided.
- D. Where materials or equipment are described but not named, provide required items of first quality, adequate in every respect for intended use. Such items shall be submitted to Architect-Engineer for review prior to procurement.
- E. Materials and equipment proposed for substitutions shall be equal to or superior to that specified in construction, efficiency, utility, aesthetic design, and color as determined by Architect-Engineer whose decision shall be final and without further recourse. Physical size of substitute brand shall be no larger than space provided including allowances for access for installation and maintenance. Requests must be accompanied by two copies of complete descriptive and technical data including manufacturer's name, model and catalog number, photographs or cuts, physical dimensions, operating characteristics and any other information needed for comparison.
- F. If the Contractor wishes to incorporate products other than those named in the Base Bid Specifications they shall submit a request for approval of equivalency in writing no later than (10) ten calendar days prior to bid date. Substitutions after this may be refused at Engineers option. Equivalentents will ONLY be considered approved when listed by addendum.
- G. In proposing a substitution prior to or subsequent to receipt of bids, include in such bid the cost of altering other elements of this project, including adjustments in plumbing or electrical service requirements necessary to accommodate such substitution.
- H. Within 10 working days after bids are received, the apparent low bidder shall submit to the Architect-Engineer for approval, three copies of a list of all major items of equipment they intend to provide. Within 30 working days after award of Contract, Contractor shall submit shop drawings for equipment and materials to be incorporated in work, for Architect-Engineer review. Where 30-day limit is insufficient for preparation of detailed shop drawings on major equipment or assemblies, Contractor shall submit manufacturer's descriptive catalog data and indicate date such detailed shop drawings will be submitted along with manufacturer's certification that order was placed within 30 working day limit.

1.12. ELECTRONIC PLAN FILES

- A. Electronic files of the contract documents may be available from the Engineer to successful bidders and manufacturers for a fee of \$50 per sheet, \$100 minimum and \$25 email/shipping charge. A release of liability form will be required along with payment prior to release of files.

1.13. OPENINGS, ACCESS PANELS AND SLEEVES

- A. This Contractor shall include the installation of all boxes, access panels and sleeves for openings required to install this work, except structural openings incorporated in the structural drawings. Sleeves shall be installed for all pipes passing through structural slabs and walls. Contractor shall set and verify the location of sleeves that pass through beams, as shown on structural plans. All floor and wall penetrations shall be sealed to meet fire-rating requirements.
- B. All penetrations through interior or exterior and rated or non-rated walls and floors shall be appropriately sealed prevent entry and movement of rodents and insects. Contractor shall coordinate their work with all other trades.

1.14. ARCHITECTURAL VERIFICATION AND RELATED DOCUMENTS

- A. Contractor shall consult all Architectural Drawings and specifications in their entirety incorporating and certifying all millwork, furniture, and equipment rough-in including utility characteristics such as voltage, phase, amperage, pipe sizes, duct sizes, including height, location and orientation. Shop drawings incorporating these requirements should be submitted to the Architect for approval prior to installation or rough in.

1.15. EXTENT OF CONTRACT WORK

- A. Provide plumbing systems indicated on drawings, specified or reasonably implied. Provide every device and accessory necessary for proper operation and completion of plumbing systems. In no case will claims for “Extra Work” be allowed for work about which Contractor could have been informed before bids were taken.
- B. Contractor shall become familiar with equipment provided by other contractors that require plumbing connections and controls.
- C. Electrical work required to install and control plumbing equipment, which is not shown on plans or specified under Division 26, shall be included in Contractor’s base bid proposal.
- D. All automatic temperature control devices shall be mounted as indicated in automatic temperature control section of specifications.
- E. The cost of larger wiring, conduit, control and protective devices resulting from installation of equipment which was not used for basis of design as outlined in specifications shall be paid for by Plumbing Contractor at no cost to Owner or Architect-Engineer.
- F. Contractor shall be responsible for providing supervision to Electrical Contractor to insure that required connections, interlocking and interconnection of plumbing and electrical equipment are made to attain intended control sequences and system operation.
- G. Furnish four complete sets of electrical wiring diagrams to Architect-Engineer to be included in the maintenance manuals and three complete sets to Electrical Contractor. Diagrams shall show factory and field wiring of components and controls. Control devices and field wiring to be provided by Electrical Contractor shall be clearly indicated by notation and drawing symbols on wiring diagrams.
- H. Contractor shall obtain complete electrical data on plumbing shop drawings and shall list this data on an approved form that shall be presented monthly or on request, to Electrical Contractor. Data shall be complete with wiring diagrams received to date and shall contain necessary data on electrical components of plumbing equipment such as HP, voltage, amperes, watts, locked rotor current to allow Electrical Contractor to order electrical equipment required in his contract.

1.16. WORK NOT INCLUDED IN CONTRACT

- A. Consult Division 21, 23, and 26 of specifications for work to be provided by Electrical Contractor in conjunction with installation of plumbing equipment.

1.17. CODES, RULES AND REGULATIONS

- A. Provide Work in accordance with applicable codes, rules and regulations of Local and State, Federal Governments and other authorities having lawful jurisdiction.
- B. Conform to latest editions and supplements of following codes, standards or recommended practices.
- C. BUILDING CODES:
 - 1. International Codes (Latest adopted version of applicable codes)
- D. SAFETY CODES:
 - 1. National Electrical Safety Code Handbook H30 - National Bureau of Standards.
 - 2. Occupational Safety and Health Standard (OSHA) - Department of Labor.
- E. NATIONAL FIRE CODES:
 - 1. NFPA No. 54 Gas Appliance & Gas Piping Installation

2. NFPA No. 70 National Electrical Code
3. NFPA No. 89M Clearances, Heat Producing Appliances
4. NFPA No. 204 Smoke & Heating Vent Guide

F. UNDERWRITERS LABORATORIES INC:

1. All materials, equipment and component parts of equipment shall bear UL labels whenever such devices are listed by UL.

G. MISCELLANEOUS CODES:

1. ANSI A117.1 - Handicapped Accessibility
2. Applicable State Boiler Codes
3. Americans with Disabilities Act (ADA)

H. ENERGY EFFICIENCY REQUIREMENTS:

1. All plumbing systems and components shall be manufactured and installed in compliance with ASHRAE 90.1 – 2019 and latest adopted version of IECC.

1.18. STANDARDS

- A. Drawings and specifications indicate minimum construction standard. Should any work indicated be sub-standard to any ordinances, laws, codes, rules or regulations bearing on work, Contractor shall promptly notify Architect-Engineer in writing before proceeding with work so that necessary changes can be made. However, if the Contractor proceeds with work knowing it to be contrary to any ordinances, laws, rules, and regulations, Contractor shall thereby have assumed full responsibility for and shall bear all costs required to correct non-complying work.

1.19. PERMITS/FEES

- A. The Contractor shall secure and pay for necessary permits and certificates of inspection required by governmental ordinances, laws, rules or regulations. Keep a written record of all permits and inspection certificates and submit two copies to Architect-Engineer with request for final inspection.
- B. The Contractor shall include in their base bid any fees or charges by the local utility providers to establish new services to the structure. Coordinate with the utility suppliers to verify exactly which part of the work required for the new utility service, is to be performed by the contractor and which part will be supplied by the utility company.

PART 2 - PRODUCTS

2.1. Not Used

PART 3 - EXECUTION

3.1. SUBMITTALS

- A. Contractor shall furnish submittals of all materials and equipment required by the specifications. Refer to each specification section for the submittals (if any) required for that section.
- B. Submittal format shall be as indicated below. Submittals not meeting these requirements will be returned without action for re-submittal.
 1. Submittals shall be furnished in an Adobe PDF format.
 2. Submittals shall be per individual submittal section, as listed in the table of contents. All required submittals within that section shall be grouped together in a single submittal.
 - a. Furnishing submittals by division or by individual item may result in delayed reviewing of the submittal(s) due to additional administrative time required to process the large size and/or quantity of files.
 3. Submittals shall have a cover page containing the following information: The project name, the applicable specification section and paragraph, the submittal date, and the Contractor's

stamp (see below for requirements).

4. Mark each submitted item as applicable with scheduled mark, name, etc. corresponding to the plans.
5. Where generic catalog cuts are submitted for review, conspicuously mark or provide schedule of equipment, capacities, controls, fitting sizes, etc. that are to be provided. Each catalog sheet shall bear the equipment manufacturer's name and address.
6. Where equipment submitted does not appear in base specifications or specified equivalent, mark submittals with applicable alternate numbers, change order number or letters of authorization.
7. All submittals on materials and equipment listed by UL shall indicate UL approval on submittal.

C. Contractor review:

1. Contractor shall check all submittals to verify that they meet specifications and/or drawings requirements before forwarding submittals to the Architect-Engineer for their review. All submittals submitted to Architect-Engineer shall bear contractor's approval stamp that shall indicate that Contractor has reviewed submittals and that they meet specification and/or drawing requirements. Contractor's submittal review shall specifically check for but not be limited to the following: equipment capacities, physical size in relation to space allowed; electrical characteristics, provisions for supply, return and drainage connections to building systems. All submittals not meeting Contractor's approval shall be returned to their supplier for re-submittal.
2. No submittals will be considered for review by the Architect-Engineer without Contractor's approval stamp, or that have extensive changes made on the original submittal as a result of the Contractor's review.
3. Before submitting shop drawings and material lists, verify that all equipment submitted is mutually compatible and suitable for the intended use. Verify that all equipment will fit the available space and allow ample room for maintenance. If the size of equipment furnished makes necessary any change in location, or configuration, submit a shop drawing showing the proposed layout.

D. Review Schedule:

1. The shop drawing / submittal dates shall be at least as early as required to support the project schedule and shall also allow for two weeks Architect-Engineer review time plus a duplication of this time for re-submittal if required.
2. Submittal of all shop drawings as soon as possible after permitting approval but before construction starts is preferred.
3. Approval of shop drawings submitted prior to receipt of a permit for that respective scope of work should be considered conditional pending review/approval of the construction documents by the AHJ. Changes required to the submittal as a result of permitting comments received after architect's/engineer's review shall not be a justification for a change in price.
4. Any time delay caused by correcting and re-submitting submittals/shop drawings will be the Contractor's responsibility.

E. The Architect's-Engineer's checking and subsequent review of such drawings, schedules, literature, or illustrations shall not relieve the Contractor from responsibility for deviations from Drawings or Specifications unless he has, in writing, called the Architect's-Engineer's attention to such deviations at the time of submission, and secured their written approval; nor shall it relieve the contractor from responsibility for errors in dimensions, details, size of members, or omissions of components for fittings; or for coordinating items with actual building conditions and adjacent work.

F. Any corrections or modifications made by the Architect-Engineer shall be deemed acceptable to the Contractor at no change in price unless written notice is received by the Architect-Engineer

prior to the performance of any work incorporating such corrections or modifications.

- G. Submittals that require re-submission shall have the items that were revised "flagged" or in some other manner marked to call attention to what has been changed.
- H. Coordination
 - 1. After shop drawings have been reviewed and approved by all parties, transmit a set of submittals to each other trade (eg Plumbing, Mechanical, Electrical, Controls, etc) that will interface with installation. Each other contractor shall review the submittal for coordination and return a stamped submittal indicating they have reviewed the submittal for coordination purposes.

3.2. SHOP DRAWINGS

- A. Shop drawings shall meet all of the above requirements for submittals.
- B. Contractor shall submit Adobe PDF sets of all fabrication drawings. Cost of drawing preparation, printing and distribution shall be paid for by the contractor and included in his base bid.
- C. No work shall be fabricated until Architect-Engineer's review has been obtained.
- D. Plumbing shop drawings for pipe fabrication shall be a minimum of 1/4" scale. Provide drawings where the complexity of the system or confines of the space require coordination with construction and other trades. Plumbing shop drawings shall not be a reproduction of the contract document and shall show details of the following: Plans, elevations above finished floor, sections, components, insulation and attachments to other work. Plumbing layout indicating sizes on plans, fittings, insulation, clearances, penetrations through fire-rated and other partitions, hangers and supports, including methods for building attachment, vibration isolation, seismic restraints, and attachment.

3.3. OPERATING AND MAINTENANCE INSTRUCTIONS (O & M MANUALS)

- A. Submit with shop drawings of equipment, four copies of installation, operating, maintenance instructions, and parts lists for equipment provided. Equipment manufacturer shall prepare instructions.
- B. Keep in safe place, keys and wrenches furnished with the equipment provided under this contract. Present to the Owner and obtain a receipt for them upon completion of project.
- C. Prepare a complete brochure, covering systems and equipment provided and installed under this contract. Submit brochures to Architect-Engineer for review before delivery to Owner. Brochures shall contain following:
 - 1. Certified equipment drawings/or catalog data with equipment provided clearly marked as outlined above.
 - 2. Record copy of all submittals indicating actual equipment installed indicating options, characteristics. Copies of submittals shall bear the stamps of all parties that reviewed submittals.
 - 3. Complete installation, operating, maintenance instructions and parts lists for each item of equipment.
 - 4. Special emergency operating instructions with a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to various parts of plumbing system.
- D. Provide brochures bound in three-ring binders with metal hinge. Reinforce binding edge of each sheet of loose-leaf type brochure to prevent tearing from continued usage. Clearly print on label insert of each brochure:
 - 1. Project name and address.
 - 2. Section of work covered by brochure, i.e., "Plumbing", etc.

3.4. RECORD DOCUMENTS

- A. During construction, keep an accurate record of all deviations between the work as shown on Drawings and that which is actually installed. Keep this record set of prints at the job site for

review by the Architect/Engineer.

- B. Upon completion of the installation and acceptance by the owner, transfer all record drawing information to one neat and legible set of prints. Then deliver them to the Architect/Engineer for transmittal to the Owner.
- C. Provide one copy of on high quality heavy weight presentation type paper. Media which fade shall not be used.
- D. Provide one electronic scanned version of record documents in Adobe PDF format – PDFs may be submitted on electronic media (DVD, USB) or via an FTP or other file sharing site. Provide electronic copies in conjunction with hard copy documents.

3.5. CLEANING UP

- A. Contractor shall take care to avoid accumulation of debris, boxes, crates, etc., resulting from the installation of his work. Contractor shall remove from the premises each day all debris, boxes, etc., and keep the premises clean.
- B. Contractor shall clean up all ductwork and equipment at the completion of the project.
- C. All equipment, cabinets and enclosures shall be thoroughly vacuumed clean prior to energizing equipment and at the completion of the project. Equipment shall be opened for observation by the Architect/Engineer as required.

3.6. WATERPROOFING

- A. Avoid, if possible, the penetration of any waterproof membranes such as roofs, machine room floors, basement walls, and the like. If such penetration is necessary, perform it prior to the waterproofing and furnish all sleeves or pitch-pockets required. Advise the Architect/Engineer and obtain written permission before penetrating any waterproof membrane, even where such penetration is shown on the Drawings.
- B. If Contractor penetrates any walls or surfaces after they have been waterproofed, he shall restore the waterproof integrity of that surface as directed by the Architect/Engineer at his own expense

3.7. CUTTING AND PATCHING

- A. Contractor shall do cutting and patching of building materials required for installation of work herein specified. Remove walls, ceilings and floors (or portions thereof) necessary to accomplish scope of work. Do not cut or drill through structural members including wall, floors, roofs, and supporting structure, without the Architect's and Structural Engineer's approval and in a manner approved by them.
- B. Make openings in concrete with concrete hole saw or concrete drill. Use of star drill or air hammer for this work will not be permitted.
- C. Patching shall be by the contractors of the particular trade involved, shall match the existing construction type, quality, finish and texture, and shall meet approval of Architect-Engineer. Damage to building finishes, caused by installation of plumbing work shall be repaired at Contractor's expense to approval of Architect-Engineer.

3.8. SETTING, ADJUSTMENT AND EQUIPMENT SUPPORTS

- A. Work shall include mounting, alignment and adjustment of systems and equipment. Set equipment level on adequate foundation and provide proper anchor bolts and isolation as shown, specified or required by manufacturers in installation instructions. Level, shim and grout equipment bases as recommended by manufacturer. Mount motors, align and adjust drive shafts and belts according to manufacturer's instructions.
- B. Equipment failures resulting from improper installation or field alignment shall be repaired or replaced by Contractor at no cost to Owner.
- C. Floor or pad mounted equipment shall not be held in place solely by its own dead weight. Include anchor fastening in all cases.
- D. Provide floor or slab mounted equipment with 3-1/2" high concrete bases unless specified otherwise. Plumbing contractor shall form all pads; General contractor shall provide and place all

concrete and reinforcing for said pads. Individual concrete pad shall be no less than 4” wider and 4” longer than equipment, and shall extend no less than 2” from each side of equipment.

- E. Provide each piece of equipment or apparatus suspended from ceiling or mounted above floor level with suitable structural support, platform or carrier in accordance with best-recognized practice. Verify that structural members of buildings are adequate to support equipment and unless otherwise indicated on plans or specified, arrange for their inclusion and attachment to building structure. Provide hangers with vibration isolators.
- F. Submit details of hangers, platforms and supports together with total weights of mounted equipment to Architect-Engineer for review before proceeding with fabrication or installation.

3.9. START-UP, CHANGEOVER, TRAINING AND OPERATIONAL CHECK

- A. Contractor shall perform the initial start-up of the systems and equipment and shall provide necessary supervision and labor to make the first seasonal changeover of systems. Personnel qualified to start-up and service this equipment, including manufacturer's technicians, and the Owner's operating personnel shall be present during these operations.
- B. Contractor shall be responsible for training Owner's operating personnel to operate and maintain the systems and equipment installed. Keep a record of training provided to Owner's personnel listing the date, subject covered, instructors name, names of Owner's personnel attending and total hours of instruction given each individual.
- C. All owner-training sessions shall be orderly and well organized and shall be video recorded digitally. At the end of the owner training, the “training” session recording shall be transmitted to the owner via DVD and shall become property of the owner.

3.10. FINAL CONSTRUCTION REVIEW

- A. At final construction review, each respective Contractor and major subcontractors shall be present or shall be represented by a person of authority. Each Contractor shall demonstrate, as directed by the Architect-Engineer, that the work complies with the purpose and intent of the contract documents. Respective Contractor shall provide labor, services, instruments or tools necessary for such demonstrations and tests.

END OF SECTION 220010

SECTION 220011 – BASIC PLUMBING MATERIALS AND METHODS**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 220010.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Provide documentation of all completed tests described herein and their results.

PART 2 – PRODUCTS (NOT APPLICABLE)**PART 3 - EXECUTION****3.1. TESTING PROCEDURES FOR PIPING SYSTEMS**

- A. Test all lines and systems before they are insulated, painted or concealed by construction or backfilling. Provide fuel, water, electricity, materials, labor and equipment required for tests.
- B. Where entire system cannot be tested before concealment, test system in sections. Verify that system components are rated for maximum test pressures to be applied. Where specified test pressures exceed component ratings, remove or isolate components from system during tests. Upon completion, each system shall be tested as an entire system.
- C. Repair or replace defects, leaks and material failures revealed by tests and then retest until satisfactory. Make repairs with new materials.
- D. All systems shall hold scheduled test pressures for specified time without loss of initial test pressure.
- E. Upon completion of testing submit five copies of a typewritten report to A/E. Report shall list systems tested, test methods, test pressures, holding time and all failures with corrective action taken.
- F. For test pressure schedules see Section 221100 of this specification.

3.2. TEST METHODS AND PRESSURES

- A. Test methods and pressures shall be as follows:
 - 1. Hydrostatic Test (Closed Systems):
 - a. Hydrostatic test shall be performed using clean unused domestic water. Test pressures shall be as scheduled for system or 150% of operating pressure where not specified.
 - 2. Hydrostatic Test (Open System):
 - a. Test entire system with 10-foot head of water. Where system is tested in sections each joint in building except uppermost 10 feet of system shall be submitted to at least 10-foot head of water. Water shall be held in system for 15 minutes before inspection starts. System shall hold test pressure without leaks.
 - 3. Pneumatic Test:
 - a. Test entire system with compressed air. Systems operating above 25 PSI shall be tested at 75 PSI or 15% of operating pressure or whichever is greater.
 - b. Allow at least 1 hour after test pressure has been applied before making initial test.
 - c. Curing test, completely isolate entire system from compressor or other sources of air pressure.

4. Pressure Relief and Safety Valve:
 - a. Before installation, test pressure temperature, and safety relief valves to confirm relief settings comply with specifications.
 - b. Tag items that pass test with date of test, observed relief pressure setting and inspector's signature.
 - c. Items installed in systems without test tag attached will be rejected.

3.3. CLEANING OF SYSTEMS AND EQUIPMENT

- A. After pressure testing of systems and equipment and before operational test thoroughly clean interiors of piping and equipment. Clean equipment as recommended by equipment manufacturers. Where specific instructions are not provided clean equipment systems as follows:

3.4. PAINTING OF MATERIALS AND EQUIPMENT

- A. Paint all exterior piping with (2) two coats of an enamel rust inhibiting exterior paint in a color selected by architect.
- B. Touch-up painting and refinishing of factory applied finishes shall be by Plumbing Contractor. Contractor shall be responsible for obtaining proper type of painting materials and color from equipment manufacturer.
- C. Unless specified otherwise factory built equipment shall be factory painted. Paint shall be applied over surfaces only after they have been properly cleaned and coated with a corrosion resistant primer.
- D. After installation, damage to painted surfaces shall be properly prepared and primed with primers equal to factory materials. Finish coating shall be same color and type as factory finish.
- E. Where extensive refinishing is required equipment shall be completely repainted.

3.5. PIPING IDENTIFICATION

- A. Provide pipe markers at 10'-0" maximum spacing to identify piping in mechanical rooms and 20'-0" maximum spacing in all other areas with Seaton Setmark pipe markers with letters and flow direction arrows.
- B. Colors and wording shall be of standard pipe markers as available from Seaton or equal. Submit for approval list of colors and wording prior to purchase of pipe markers.
- C. Pipe marker nomenclature/colors shall meet applicable ANSI Standard and OSHA requirements.

3.6. VALVE IDENTIFICATION

- A. Mark all valves with Seton No. 300-BL brass identification tags with system legend, valve number and size stamped on tag. Lettering shall be black 1/2" high. Tags shall be minimum 2" in diameter and attached to valve with Seton No. 16 brass jack chain.
- B. Prepare four copies of typewritten list of valve tags. List shall be typed in upper case and contain tag number, valve size, type, function and location. Frame one list under glass and mount near operating instruction in main equipment rooms.

3.7. EQUIPMENT LABELS:

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware. Black letters on white background.
- B. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- C. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- D. Fasteners: Stainless-steel rivets or self-tapping screws.
- E. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- F. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification

Section number and title where equipment is specified.

3.8. EXCAVATION AND BACKFILL

- A. Perform necessary excavation to receive Work. Provide necessary sheathing, shoring, cribbing, tarpaulins, etc. for this operation, and remove it at completion of work. Perform excavation in accordance with appropriate section of these specifications, and in compliance with OSHA Safety Standards.
- B. Excavate trenches of sufficient width to allow ample working space, and no deeper than necessary for installation work.
- C. Conduct excavations so no walls or footings are disturbed or injured. Backfill excavations made under or adjacent to footing with selected earth or sand and tamp to compaction required by Architect-Engineer. Mechanically tamp backfill under concrete and pavings in six inch layers to 95% standard density, Reference Division 2.
- D. Backfill trenches and excavations to required heights with allowance made for settlement. Tamp fill material thoroughly and moistened as required for specified compaction density. Dispose of excess earth, rubble and debris as directed by Architect.
- E. When available, refer to test hole information on Architectural or Civil drawings or specifications for types of soil to be encountered in excavations.

3.9. FIRE BARRIERS

- A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
- B. SUBMITTALS
 - 1. Product Data: For each type of product indicated.
 - 2. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
 - a. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
 - b. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
 - 3. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:
 - a. Types of penetrating items.
 - b. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
 - c. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.
- C. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.
- D. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- E. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate

through-penetration firestop systems.

- F. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by building inspector, if required by authorities having jurisdiction.
- G. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.
- H. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- I. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.
- J. Provide sleeves through all fire-rated walls and fill voids surrounding sleeves and interior to sleeves around piping with Nelson “Flameseal” fire stop putty with U.L. listed 3 hour rating installed as per manufacturers recommendations.
 - 1. Equivalent by Hilti, Inc., Johns Manville, Nelson Firestop Products, NUCO Inc., RectorSeal Corporation, Specified Technologies Inc., 3M, Tremco, USG, Dow, Chemelex.

3.10. EQUIPMENT ANCHORS

- A. Provide floor or foundation mounted equipment such as pumps, boilers, air handling units, etc. with Decatur Engineering Company concrete anchors.
- B. Where equipment anchors cannot be installed during forming of floors or foundations anchor equipment with McCulloch Kwik-Bolt concrete anchors.
- C. Anchors shall be proper type and size recommended by manufacturer for equipment to be anchored.

3.11. WELDING

- A. Contractor shall be responsible for quality of welding and suitability of welding procedures. All welding shall be in accordance with American Welding Society Standard B3.0 and ANSI Standard B31.1.
- B. Welded pipe joints shall be made by certified welding procedures and welders. Welding electrodes shall be type and material recommended by electrode manufacturer for materials to be welded. All pipe and fittings ends shall be beveled a minimum of 30 degrees prior to welding.
- C. Only welders who have successfully passed welder qualifications tests in previous 12 months for type of welding required shall do welding. Each welder shall identify his work with a code marking before starting any welded pipe fabrication. Contractor shall submit three copies of a list of welders who will work on project listing welders’ code, date and types of latest qualification test passed by each welder.
- D. Welded joints shall be fusion welded in accordance with Level AR3 of American Welding Society Standard AWS D10.9 “Standard for Qualification of Welding Procedures and Welders for Pipe and Tubing”. Welders qualified under National Certified Pipe Welding Bureau will be acceptable.
- E. Bevel all piping and fittings in accordance with recognized standards by flame cutting or mechanical means. Align and position parts so that branches and fittings are set true. Make changes in direction of piping systems with factory made welding fittings. Make branch connections with welding tees or forged weldolets.

END OF SECTION 220011

SECTION 220013 – PROJECT COORDINATION**PART 1 GENERAL****1.1. RELATED DOCUMENTS**

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

1.2. SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination Drawings.
 - 2. Administrative and supervisory personnel.
 - 3. Project meetings.
 - 4. Requests for Interpretation (RFIs).
- B. Each related sub-contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.

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, that 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. 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. Delivery and processing of submittals.
 - 2. Progress meetings.
 - 3. Preinstallation conferences.
 - 4. Project closeout activities.
 - 5. Startup and adjustment of systems.

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.
 - 1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination

Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:

- a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate required installation sequences.
 - c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
2. Sheet Size: At least 8-1/2 by 11 inches but no larger than 30 by 40 inches. Format shall be PDF or other electronic format to facilitate multiple user commenting and sharing easily.
 3. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including project managers, superintendent and other personnel in attendance at Project site to the General Contractor and other major subcontractors. Identify individuals and their duties and responsibilities; list email addresses and telephone numbers. Update the list as required during the project if personnel change.

1.5. COORDINATION

- A. Certain materials will be provided by other trades. Examine the Contract Documents and reviewed record Submittals to ascertain these general requirements. Contract Documents reflect a basis of design and may not reflect actual equipment or items being utilized.
- B. Carefully check space requirements with other trades and the physical confines of the area to insure that all material can be installed in the spaces allotted thereto including finished suspended ceilings and the spaces within the existing building. Make modifications thereto as required and approved.
- C. Transmit to other trades all information required for work to be provided under their respective Sections in ample time for installation.
- D. Wherever work interconnects with work of other trades, coordinate with other trades to insure that all trades have the information necessary so that they may properly install all the necessary connections and equipment. Identify all items of work that require access so that the ceiling trade will know where to install access doors and panels.
- E. Obtain equipment submittal information for all pieces of equipment to be connected to from other trades that clearly indicates all connection requirements, locations, sizes, and similar requirements. Obtain this information in ample time to coordinate other trade submittals and equipment coordination. Where requirements differ from that on plans or differs from provisions made in the work, immediately notify the Architect/Engineer. Do not proceed with work that is incompatible with equipment provided.
- F. Coordinate, project and schedule work with other trades in accordance with the construction sequence.
- G. Coordinate with the local Utility Companies to their requirements for service connections and provide all necessary materials, labor and testing.
- H. Coordinate with contractors for work under other Divisions of this specification for all work necessary to accomplish this contractor's work.
- I. Conduct a coordination meeting after reviewing all other trade coordination drawings with other relevant trades. This meeting shall be held to prevent conflicts during construction. Each major relevant subcontractor shall attend this meeting. Report any potential conflicts or clearance problems to Architect/Engineer after meeting.
- J. Adjust location of piping, ductwork, conduit, wiring, etc. to prevent interferences, both anticipated and encountered. Determine the exact route and location of each item prior to fabrication.

1. Right-of-Way:
 - a. Lines that pitch have the right-of-way over those that do not pitch. For example: steam, condensate, and plumbing drains normally have right-of way. Lines whose elevations cannot be changed to have right-of-way over lines whose elevations can be changed.
 - b. Make offsets, transitions and changes in direction in raceways as required to maintain proper headroom in pitch of sloping lines whether or not indicated on the Drawings.

1.6. DRAWINGS AND FILES.

- A. The Drawings show only the general run of MEP systems, equipment, fixtures, piping and ductwork and other components as well as approximate location of items such as outlets, switches, diffusers, lights, and equipment connections, etc. Coordinate all exact locations of items with other trades, architectural elevations, equipment requirements, owner requirements, ceilings, access, serviceability, etc. All such modifications and coordination shall be made without additional cost to the Owner. Any significant changes in location of items necessary in order to meet field conditions shall be brought to the immediate attention of the Architect/Engineer and receive his approval before such alterations are made
- B. Wherever the work is of sufficient complexity, additional Detail Drawings to scale similar to that of the bidding Drawings, prepared on tracing medium of the same size as Contract Drawings. With these layouts, coordinate the work with the work of other trades. Such detailed work to be clearly identified on the Drawings as to the area to which it applies. Submit for review Drawings clearly showing the work and its relation to the work of other trades before commencing shop fabrication or erection in the field. Attend meetings with other trades to review all documents.
- C. When directed by the General Contractor for areas of necessary coordination provide 3D building modelling coordination files and documents with other trades. Transmit information electronically and attend meetings as directed by the G/C as well as take part in coordination activities and documentation. Contractor shall be required to generate their own electronic files for this process.

1.7. PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.

- e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Possible conflicts.
 - i. Compatibility problems.
 - j. Time schedules.
 - k. Manufacturer's written recommendations.
 - l. Warranty requirements.
 - m. Compatibility of materials.
 - n. Space and access limitations.
 - o. Regulations of authorities having jurisdiction.
 - p. Testing and inspecting requirements.
 - q. Installation procedures.
 - r. Coordination with other work.
 - s. Required performance results.
 - t. Protection of adjacent work.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to 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.
- C. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contractor is on time, ahead or behind schedule, in relation to Construction Schedule. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time. Discuss impact of various contractor schedules upon other contractors and how to remedy impacts.
 - b. Review present and future needs of each contractor present, including the following:
 - i. Interface requirements.
 - ii. Sequence of operations.
 - iii. Status of submittals.
 - iv. Deliveries.
 - v. Off-site fabrication.
 - vi. Access.
 - vii. Quality and work standards.
 - viii. Change Orders.
 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to

others affected by decisions or actions resulting from each meeting.

1.8. REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI.
 - 1. Submit Contractor's suggested solution(s) to RFI. If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - 2. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

3.1. EQUIPMENT FURNISHED BY OTHERS

- A. Description:
 - 1. Items furnished by other trades (electrical contractor, etc.) such as disconnect switches, etc.
 - 2. Kitchen Equipment (may be furnished by owner, owner's vendor, or separate sub-contractor)
 - 3. Equipment furnished by general contractor
 - 4. Equipment furnished by owner
- B. General
 - 1. Fully review manufacturer's installation instructions for equipment. Installation of all related plumbing items shall be per same.
 - a. Plumbing contractor shall obtain same from others if not readily available.

END OF SECTION 220013

SECTION 220505 – PLUMBING DEMOLITION**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 220010.
- B. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUMMARY

- A. This Section requires the selective removal and subsequent offsite disposal of the following:
 - 1. Plumbing and electrical equipment, devices, piping, conduits, ductwork, insulation, lighting, etc in existing building indicated on drawings and as required to accommodate new construction.
 - 2. Removal of MEP items in interior partitions as indicated on drawings.
 - 3. Removal and protection of existing fixtures, materials, and equipment items indicated to be removed, salvaged, relocated, reinstalled, etc.

1.3. SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Schedule indicating proposed sequence of operations for selective demolition work to Architect for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
 - 1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
 - 2. Coordinate with Owner's continuing occupation of portions of existing building and with Owner's partial occupancy of completed remodeled areas.
- C. Photographs of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with Architect prior to start of work.

1.4. JOB CONDITIONS

- A. Occupancy:
 - 1. Owner will occupy portions of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in such a manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities that will affect Owner's normal operations.
- B. Condition of Structures:
 - 1. Owner assumes no responsibility for actual condition of items or structures to be demolished. Conditions existing at time of Contractor's inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.
 - 2. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed. Storage or sale of removed items on site will not be permitted.
 - 3. Protections: Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.
 - 4. Provide protective measures as necessary and required to provide free and safe passage of Owner's personnel and general public to any occupied portions of building.

5. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain.
 6. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
 7. Construct temporary insulated dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks.
 8. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
 9. Remove protections at completion of work.
- C. Damages:
1. Promptly repair damages caused to adjacent facilities by demolition work.
- D. Traffic:
1. Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- E. Flame Cutting:
1. Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations.
- F. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
- G. Maintain fire protection services during selective demolition operations.
- H. Environmental Controls:
1. Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing and/or approved regulations pertaining to environmental protection. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1. PREPARATION

- A. General:
1. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
 2. Cease operations and notify Architect immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
- B. Provide all necessary temporary supports of items and systems to remain that were supported from

or otherwise affected by removal of other building components. Maintain integrity of all systems to remain and protect during the construction process.

- C. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to any occupied portions of the building.
- D. Where selective demolition occurs immediately adjacent to any occupied portions of the building, construct dust-proof partitions of minimum 4-inch studs, 5/8-inch drywall (joints taped) on occupied side, 1/2-inch fire-retardant plywood on demolition side. Fill partition cavity with sound-deadening insulation as required by Architect.
 - 1. Provide weatherproof closures for exterior openings resulting from demolition work.

3.2. DEMOLITION

A. General:

- 1. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.
- B. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.
- C. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
- D. Provide services for effective air and water pollution controls as required.
- E. Completely fill below-grade areas and voids resulting from demolition work. Provide fill consisting of approved earth, gravel, or sand, free of trash and debris, stones over 6 inches in diameter, roots, or other organic matter.
- F. If unanticipated plumbing, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to architect in written accurate detail. Pending receipt of directive from Architect, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.3. DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove debris, rubbish, and other materials resulting from demolition operations from building site. Transport and legally dispose off site.
- B. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
- C. Burning of removed materials is not permitted on Project site.

3.4. CLEANUP AND REPAIR

A. General:

- 1. Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION 220505

SECTION 220513 – COMMON MOTOR REQUIREMENTS FOR PLUMBING**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 220010.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

PART 2 - PRODUCTS**2.1. MOTORS**

- A. Motors shall be installed in strict accordance with rules set forth by NEC and equipment manufacturer.
- B. ELECTRIC MOTORS (Less than ½ HP)
 - 1. Motors 1/3 horsepower and smaller shall be selected by manufacturer of driven equipment with motor speed and torque characteristics best suited for application.
 - 2. Motors shall have a minimum service factor of 1.15 for open dripproof enclosure and 1.00 for totally enclosed motors. Wherever applicable provide motors with cushion bases. Motor enclosure shall be proper type required for operating environment.
 - 3. Motors shall have a plus or minus 10% voltage tolerance and plus or minus 5% frequency tolerance. Motors shall operate satisfactorily in ambient temperature range of 0 degrees C (32°F) to 140°C (104°F) at altitudes below 3300 feet.
 - 4. Provide motors with built-in thermal overload protection. Motors readily accessible to operating personnel shall have manual reset protector. All other shall have automatic reset protectors.
 - 5. Motors shall have AFBMA standard double-shielded ball bearings sized for average life of at least 100,000 hours under normal loading conditions. Bearings housing shall have provisions for adding new lubricant without major disassembly and shall have seals to prevent entrance of foreign matter and leakage of bearing lubricant.
 - 6. Motor bolts, screws and other external hardware shall be treated with corrosion resistant plating and motor enclosure prime painted with corrosion resistant metal primer finished with a durable machinery enamel.
 - 7. Unless indicated otherwise motors shall be rated for continuous operation at 115, 200, or 277 volt single phase 60 hertz. Where equipment manufacturer offers a choice provide permanent split capacitor motors in lieu of shaded pole motors.
 - 8. Motor leads shall be marked throughout entire length for easy identification and terminate with brass or copper terminal lugs. Motor shall have permanently attached nameplate with electrical characteristics and wiring connection diagram.
- C. ELECTRIC MOTORS (1/2 HP and Larger)
 - 1. Provide equipment requiring electric motors with NEMA Standard motors. Shop drawings, submitted and equipment provided with electric motors shall include motor manufacturer, horsepower, voltage, full load amperes, NEMA design type, insulation class, shaft bearing type, mounting base type, and enclosure type. To greatest extent possible motors for this project shall be by one manufacturer.
 - 2. Motors shall conform to current NEMA Standard MG1. Motor shall operate successfully without derating under the following conditions.
 - 3. 40 degrees C (104°F) maximum ambient temperature, 3,300 Ft. maximum altitude, voltage variations of plus or minus 10% of nameplate rating, frequency variations of plus or minus 5% of nameplate rating, combined voltage and frequency variation of plus or minus 10% total as long as frequency does not exceed plus or minus 5%.

4. Motors shall meet or exceed locked rotor (Starting) and breakdown (maximum) torques specified for the NEMA design rating. Lock rotor currents shall not exceed NEMA maximum values for motor NEMA design rating.
5. Motor service factors shall be 1.15 for open dripproof motors and 1.00 for totally enclosed motors.
6. Unless indicated otherwise, motor insulation may be manufacturers standard for Class A, B or F provided that maximum permissible temperature for insulation is not exceeded when motor is operating at its service factor load in a 40 Degrees C (104°F) ambient.
7. Motor frame/HP relationship shall conform to current NEMA Standard for “T” frames. Motors shall have antifriction ball or roller bearings sized for average life of at least 100,000 hours under normal v-belt loading conditions. Bearings shall be AFBMA Standard and shield mounted ball bearings of ample capacity for motor rating. Bearing housing shall have provisions for adding new lubricant and draining out old lubricant without major motor disassembly. Bearing housing shall have seals to protect bearing from entrance of foreign matter and to prevent leakage of bearing lubricant.
8. Conduit box mounting shall rotate to allow conduit entrance from top, bottom or either side. Conduit holes shall conform to NEC Standards.
9. Motor leads shall have same insulation class as motor windings. Leads shall be marked throughout entire length for easy identification and terminated with brass or copper terminal lugs. Motor shall have permanently attached nameplate with electrical characteristics and wiring connection diagram.
10. Motor bolts, screws and other external hardware shall be treated with a corrosion resistant plating. Motor enclosure shall be prime painted with corrosion resisting metal primer and finished with a durable machinery enamel paint.
11. Unless indicted otherwise motors shall be rated for continuous operation at rated voltage, three phase, 60 hertz. Motors shall be T-frame squirrel cage induction. Type NEMA design B with Class B insulation. Motors shall be dripproof totally enclosed or explosion-proof as required by motor environment.

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION 220513

SECTION 220514 – MOTOR CONTROL AND EQUIPMENT DISCONNECTS

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

- A. Reference Section 220010.
- B. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data: For each type of disconnect to be furnished.
- B. Dimensional Drawings: For each respective type and size of disconnect.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

- A. Equivalents by: G.E., Cutler Hammer, or I.T.E. Siemens, Square D.

2.2. DISCONNECT SWITCHES

- A. Provide heavy-duty horsepower rated Safety Switches rated in accordance with NEMA enclosed Switch Standard KS 1-1969 and L98 Standard.
- B. Enclosure shall be NEMA type and material required by switch location and environment. Enclosure door shall latch with means for padlocking and cover interlock with defeater to prevent opening door when switch is energized or closing switch with door open. Switch shall have an embossed nameplate permanently attached to door front with switch rating, short circuit interrupting capacity and application information.
- C. Line terminals shall be permanently marked and shielded. Contact shall be tin plated, equipped with arch chutes and have movable contacts visible in off position with door open. Wiring terminals shall be pressure type suitable for copper or aluminum wire. Switching mechanism shall be quick-make, quick-break spring driven anti-tease mechanism and shall be integral part of box. All current carrying parts shall be plated.
- D. Fuse holders shall be high pressure suitable for use with dual element fuses or rejection type current limiting fuses where required. Fuse holders shall be completely accessible from front of switch and fuses shall be installed so that the label may be easily read from the front and without removing the fuse.

2.3. COMBINATION MAGNETIC MOTOR STARTERS

- 1. Provide 600 volt, 60 hertz AC across-the-line fusible or non-fusible as scheduled magnetic type rated in accordance with NEMA Standards and listed and labeled in accordance with UL Standard 508 Eleventh Edition.
- 2. Starter NEMA enclosure type shall be type required for starter location and environment.
- 3. Combination starter shall be a factory assembled unit with internal wiring and control circuits prewired with only line, load, and external control circuit wiring connections required.
- 4. Where fusible CMS are called for fuse holders shall be high pressure suitable for use with dual element fuses or rejection type current limiting fuses where required.
- 5. Fuse holders shall be completely accessible from front of switch and fuses shall be installed so that the fuse type and size may be easily read from the front and without removing the fuse.
- 6. See plans for combination magnetic starters.

2.4. MANUAL MOTOR CONTROL (1 HP Maximum)

- A. Provide 300 volt, 60 cycle, AC manually operated motor starting switch meeting current NEMA

- Standards with proper NEMA enclosure required by starter location and environment.
- B. Starter shall have heavy silver alloy contacts with quick-make, quick-break mechanism manually operated by toggle switch.
 - C. Thermal unit shall be melting alloy type, resettable, one-piece interchangeable construction.
 - D. Provide starter with all accessories such as pilot light, H.O.A. or two speed switches required to provide control sequence shown on drawings or specified. Selector switches contact shall have same ampere rating as starter switch.

PART 3 EXECUTION

3.1. INSTALLATION

- A. All fuse holders shall have rejection clips installed.
- B. Mount starter enclosure rigidly and with proper alignment on building structure or steel supports with operating switches not more than 6 feet above finished floor unless otherwise required. Use steel supports fabricated from standard rolled structural steel shapes or framing channel to provide one-inch separation between enclosure and building wall for vertical flow of air.
- C. Furnish and install a nameplate for each starter/switch engraved with the equipment designation which the disconnect serves.
- D. All starters/disconnect switches as specified shall be installed in strict accordance with rules set forth by NEC.
- E. Install starters in locations as shown on plans, installation shall be in strict accordance with NEC, and manufacturer's installation requirements.

END OF SECTION 220514

SECTION 221000 – PLUMBING PIPING**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 220010.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data: For each type of product to be used.

PART 2 - PRODUCTS**2.1. PIPING MATERIALS**

- A. Piping used throughout project shall conform to the following specifications. Piping shall be plainly marked with manufacturers name and weight. See piping material schedule at end of this Section for materials to be used for each piping system.

- 1. Carbon Steel Pipe (1/8" thru 2"):
 - a. Pipe:
 - i. Provide seamless carbon steel conforming to ASTM specification A-106. Pipe joints shall be threaded conforming to ANSI Standard B2.1.
 - b. Carbon Steel Welding Fittings:
 - i. Provide carbon low alloy seamless steel welding fittings conforming to current ANSI Standard B16.9 and ASTM Specification A234.
 - c. Grooved Joint Fittings:
 - i. Provide ductile iron fittings conforming to ASTM A536, Grade 65-45-12; or factory-fabricated from ASTM A53 steel pipe.
 - d. Branch Connection Welding Fittings:
 - i. Provide carbon steel weldolet fittings conforming to ANSI Standards B16.9, B16.11, B31.1.0 and ASTM specification A105, Grade 11.
 - e. Branch Connection, Welding to Screwed Fitting:
 - i. Provide carbon steel threadolet fitting conforming to ANSI Standards B16.9, B16.11, B31.1, and ASTM Specification A105, Grade 11.
 - f. Carbon Steel Flanges:
 - i. Provide carbon steel flanges conforming to ASTM Specification A181, Grade 1, and ANSI Standard B16.5.
 - g. Malleable Iron Screwed Fittings:
 - i. Provide screwed malleable iron fittings conforming to ANSI Standard B16.3, and ASTM Specification A-47 grade 32510.
 - h. Cast Iron Screwed Fittings:
 - i. Provide screwed cast iron fittings conforming to ANSI Standard B16.4, B2.1, and ASTM Specification A-126, Class A.
- 2. Copper Tube:
 - a. Tube/Pipe:

- i. Provide hard temper copper water tube conforming to requirements of current ASTM Specification B-88. Tubing shall be Type K, L, or M as listed in schedule. Tubing joints shall be soldered, brazed or Viega Pro-Press style fittings. See schedule for joining method to be used.
 - ii. Pipe by Anaconda, Cerro, Chase, Mueller or Revere Copper.
 - b. Wrought Copper Fittings:
 - i. Provide wrought solder joint copper tube fitting conforming to ANSI Standard B16.22
 - ii. Fittings by Anaconda, Chase, Nibco
 - c. Grooved Joint Fittings: ASME B16.22 wrought copper or cast bronze to ASME B16.18. Manufactured to copper-tube dimensions. (Flaring of tube or fitting ends to accommodate alternate sized couplings is not permitted.) Victaulic Copper Connection.
 - d. Provide Victaulic Installation-Ready Style 607H couplings with grade 'EHP' gasket. Copper-tube dimensions with offsetting, angle-pattern bolt pads.
 - e. Press fitting: Provide fittings for press style joints by Viega, Merit or Nibco.
- 3. Polyvinyl Chloride Drain Waste Pipe:
 - a. Pipe:
 - i. Provide Schedule 40 polyvinyl chloride solid core plastic drain waste and vent pipe conforming to ASTM D2665. Joints shall be properly cleaned, primed and glued where scheduled.
 - ii. Polyvinyl Chloride (PVC) Pipe & Fittings Cell Class 12454 B. ASTM D 2241 SDR-26
 - iii. Pipe by Charlotte, Genova, Crestline or equal.
 - b. PVC Fittings:
 - i. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe. PVC Non-pressure Piping Joints: Join piping according to ASTM D 2665.
 - ii. Joints shall be of a push-on type with a bell-end grooved to receive a synthetic rubber gasket when scheduled. Solvent welded joints are not allowed outside the building. The joint shall be made in accordance with ASTM D 3212.
 - iii. Equivalents: Spears, Lasco or equal.

PART 3 EXECUTION

3.1. PIPING INSTALLATION

- A. Piping systems materials and installation shall conform to the following standards and codes.
- B. No piping containing water shall be located in areas subject to freezing temperatures, including: unheated attics, unheated plenums, chases wall spaces or cavities within exterior walls, under slabs, or in concrete.
- C. Pipe sizes indicated on plans and as specified refer to nominal size in inches, unless otherwise indicated. Pipes are sized to nearest 1/2". In no case shall piping smaller than size specified be used.
- D. Install drainage piping pitched down at a minimum slope of 1/4 inch per foot (2 percent) for piping 3 inch and smaller, and 1/8 inch per foot (1 percent) for piping 4 inch and larger. Install vent piping pitched to drain back by gravity to the sanitary drainage piping system.
- E. Contractor shall provide and be responsible for proper location of pipe sleeves, hangers, supports, and inserts. Install hangers, supports, inserts, etc., as recommended by manufacturer and as specified and detailed on drawings.

- F. Verify construction types and provide proper hangers, inserts and supports for construction used. Install inserts, hangers and supports in accordance with manufacturers load ratings and provide for thermal expansion of piping without exceeding allowable stress on piping or supports. Provide solid type hangers and supports where pipe travel exceeds manufacturer's recommendations for fixed hanger and supports.
- G. Install piping parallel with building lines and parallel with other piping to obtain a neat and orderly appearance of piping system. Secure piping with approved anchors and provide guides where required to insure proper direction of piping expansion. Piping shall be installed so that allowable stress for piping, valves and fittings used are not exceeded during normal operation or testing of piping system.
- H. Install piping so that systems can be completely drained. Provide piping systems with valve drain connections at all low pipe and ahead of all sectionalizing valves whether shown on plans or not. Drain lines shall be ¾".
- I. Drain valves on closed piping systems such as chilled water system shall have lock shields and plugged or capped outlets to protect system from inadvertent drainage.
- J. Pitch all piping and where possible make connections from horizontal piping so that air can be properly vented from system. Provide air vents as specified at all system high points and at drop in piping in direction of flow. Use eccentric reducers where necessary to avoid air pockets in horizontal piping.
- K. Provide unions or flanged joints in each pipe line preceding connections to equipment to allow removal for repair or replacement. Provide all screwed and control valves with unions adjacent to each piping connection. Provide screwed end valves with union adjacent to valve unless valve can be otherwise easily removed from line.
- L. Fittings pressures and temperature ratings shall be equal to or exceed maximum operating temperature and working pressure of piping system. No mitered or field fabricated pipe fittings will be permitted.
- M. All pipe threads shall meet ANSI Standard B2.1 for taper pipe threads. Lubricate pipe threads with Teflon thread sealant and lubricating compound applied full strength. Powdered or made-up compound will not be permitted. Pipe thread compound shall be applied only to male pipe threads.
- N. Brazed socket type joints shall be made with suitable brazing alloys. Minimum socket depth shall be sufficient for intended service. Brazing alloy shall be end fed into socket, and shall fill completely annular clearance between socket and pipe or tube. Brazed joints depending solely upon a fillet rather than a socket type joint will not be acceptable.
- O. Soft soldered socket type joints shall be made with sill-floss or 95-5 tin-antimony solder as required by temperature and pressure rating of piping system. Soldered socket-type joints shall be limited to systems containing non-flammable and non-toxic fluids. Soldered socket-type joints shall not be used on piping systems subject to shock vibration. Soldered joints depending solely upon a fillet rather than a socket-type joint will not be acceptable.
- P. Make changes in piping size and direction with approved factory made fittings. Provide fittings suitable for at least 125 PSI working pressure or of pressure rating required for maximum working pressure of system whichever is greater.

3.2. PIPING SUPPORTS, ANCHORS, SLEEVES AND SEALS

- A. Furnish proper type and size pipe sleeves to General Contractor for installation in concrete or masonry walls or floors. Sleeves are not required for supply and waste piping through wall supporting plumbing fixtures or for cast iron soil pipe passing through concrete slab or grade except where penetrating a membrane waterproof floor.
- B. Plumbing Contractor shall supervise installation of sleeves to insure proper location and installation.
- C. Each sleeve shall be continuous through wall floor or roof and shall be cut flush on each side except where indicated otherwise. Sleeves shall not be installed in structural member except where indicated or approved.
- D. Sleeves passing through above grade floors subject to flooding such as toilet rooms, bathrooms,

equipment rooms and kitchens shall be cast iron with integral flanges and shall extend 1 inch above finished floor. Size sleeves for and seal space between pipe sleeve with Thunderline Link-Seal.

- E. Provide steel pipe sleeves in bearing walls and masonry walls. Opening in non-bearing walls, floors and ceilings may be 20 gauge galvanized pipe sleeves or openings cut with concrete core drill.
- F. Pipe insulation shall run continuous through pipe sleeves with ¼” minimum clearance between insulation and pipe sleeve. Provide metal jackets over insulated pipes passing through fire walls, floors and smoke partitions. Jacket shall be 0.018 stainless steel extending 12 inches on either side of barrier and secured to insulation with 3/8” wide band. Seal annular space between jacket and pipe sleeves with Thunderline High Temperature Link Seal.
- G. Pipe wall penetrations exposed to view shall have tight fitting escutcheons or flanges to cover all voids around openings.
- H. All below grade and exterior wall penetrations shall be installed in a pipe sleeve and sealed between the pipe and pipe sleeve with Thunderline High Temperature Link Seal.
- I. Provide sleeves through all fire-rated walls and fill voids surrounding sleeves and interior to sleeves around cables with Nelson “Flameseal” fire stop putty with U.L. listed 3 hour rating installed as per manufacturers recommendations.
 - 1. Equivalent by Hilti, Inc., Johns Manville, Nelson Firestop Products, NUCO Inc., RectorSeal Corporation, Specified Technologies Inc., 3M, Tremco, USG, Dow, Chemelex.

3.3. PIPE HANGERS AND SUPPORTS

- A. Provide and be responsible for locations of piping hangers, supports and inserts, etc., required for installation of piping under this contract. Design of hangers and supports shall conform to current issue of Manufacturers Standardization Society Specification (MSS) SP-58.
- B. Pipe hangers shall be capable of supporting piping in all conditions of operation. They shall allow free expansion and contraction of piping, and prevent excessive stress resulting from transferred weight being induced into pipe or connected equipment. Support horizontal or vertical pipes at locations of least vertical movement.
- C. Where horizontal piping movements are such that hanger rod angularity from vertical is greater than 4 degrees from cold to hot position of pipe, offset hanger, pipe, and structural attachments so that rod is vertical in hot position.
- D. Hangers shall not become disengaged by movements of supported pipe.
- E. Provide sufficient hangers to adequately support piping system at specified spacing, at changes in piping direction and at concentrated loads. Hangers shall provide for vertical adjustment to maintain pitch required for proper drainage, and for longitudinal travel due to expansion and contraction of piping. Fasten hangers to building structural members wherever practicable.
- F. Unless indicated otherwise on drawings support horizontal steel piping as follows:

PIPE SIZE	ROD DIAMETER	MAXIMUM SPACING
Up to 1-1/4”	3/8”	8 Ft.
1-1/2” to 2”	3/8”	10 Ft.
2-1/2” to 3-1/2”	½”	12 Ft.
4” and 5”	5/8”	15 Ft.

- G. Unless indicated otherwise on drawings support horizontal copper tubing as follows:

NOM. TUBING SIZE	ROD DIAMETER	MAXIMUM SPACING
Up to 1”	3/8”	6 Ft.

1-1/4" to 1-1/2"	3/8"	8 Ft.
2"	3/8"	9 Ft.
2-1/2"	1/2"	9 Ft.
3" and 4"	1/2"	10 Ft.

- H. Support horizontal cast iron soil pipe with two hangers for each section located close to each hub.
- I. Support vertical cast iron soil pipe at every floor, steel and copper tubing at every other floor except where indicated otherwise on drawings.
- J. Provide continuous threaded hanger rods wherever possible. No chain, wire, or perforated straps shall be used.
- K. Hanger rods shall be subject to tensile loading only, where lateral or axial pipe movement occurs provide suitable linkage to permit swing. Provide pipe support channels with galvanized finish for concealed locations and painted finish for exposed locations. Submit design for multiple pipe supports indicating pipe sizes, service and support detail to Architect-Engineer for review prior to fabrication.
- L. Provide Grinnell pipe hangers for vertical pipe risers as follows:

PIPE MATERIAL	PIPE SIZE	HANGER FIG. NO.
Copper	1/2" thru 4"	CT-121
Steel	3/4" thru 20"	261

- M. Provide Grinnell Fig. 194, 195 or 199 steel wall brackets for piping suspended or supported from walls. Brackets shall be prime coated carbon steel.
- N. Mount hangers for insulated piping on outside of pipe insulation sized to allow for full thickness of pipe insulation.
- O. Provide Grinnell Fig. 167 insulation protection shields sized so that line compressive load does not exceed one-third of insulation compressive strength. Shield shall be galvanized steel and support lower 180 degrees of pipe insulation on copper tubing. Provide calcium silicate blocking insulation at each pipe hanger in thickness of other adjacent insulation. Insulation vapor barrier jacket shall overlap to maintain vapor barrier continuous.

3.4. INSULATION MATERIALS AND APPLICATIONS METHODS (HANGERS, SUPPORTS, ANCHORS, GUIDES, EXPANSION JOINTS, ETC.)

- A. Insulation materials and application methods for piping hangers supports, anchors, guides expansion joints, etc., shall be as follows:
 1. Insulate hangers and supports from direct contact with cold or hot surfaces (-120°F to 450°F) with rigid calcium silicate insulation at suspension points to prevent crushing of insulation.
 2. The length or thickness of the insulation support same as the pipe insulation thickness. Provide ASJ type discs or otherwise reestablish vapor barrier.
- B. Structural attachments for pipe hangers shall be as follows:
- C. Concrete Structure: Provide Grinnell Fig. No. 285 cast in concrete insert for loads up to 400 lbs. and Grinnell Fig. 281 wedge cast in type concrete insert for loads up to 1200 lbs.
- D. Provide Grinnell pipe hangers for horizontal single pipe runs as follows:

PIPE MATERIALS	PIPE SIZE	HANGER FIG. NO.
Copper	1/2" thru 4"	CT-65
Steel	3/8" thru 4"	65
Steel	5" thru 30"	260

- E. Provide Fee and Mason Fig. 600 channel trapeze pipe hangers for horizontal multiple pipe runs

with pipe clamps or pipe rollers as follows:

PIPE MATERIALS	PIPE SIZE	CLAMP NO.	ROLLER NO.
Copper	3/8" thru 4"	8600 CP*	8010 CP*
Steel	3/8" thru 6"	8500	8010

*Copper Plated

- F. Pipe supports for horizontal piping mounted on pipe racks or stanchions shall be Advanced Thermal Systems low friction graphite slide supports or equivalent by Elcen or Grinnell. Where racks and supports are not detailed on drawings submit detailed support drawings to Architect-Engineer for review prior to fabrication.
- G. Provide Fee and Mason Fig. 404 vibration control hangers at locations where piping vibrations would be transmitted to building structure by conventional hangers. Apply hangers within their load supporting range.
- H. Provide Elcen Fig. 50 pipe saddle with adjuster to support piping from floor. Provide complete with pedestal type floor stand.
- I. Provide necessary structural steel and attachment accessories for installations of pipe hangers and supports. Where heavy piping loads are to be attached to building structure verify structural loading with Architect-Engineer prior to installations.
- J. Equivalent hangers and supports by Auto-Grip, Basic Engineer, Bee Line, Elcen, Fee & Mason, Fluorocarbon Company, Unistrut or Super Strut Inc.

END OF SECTION 221000

SECTION 221429 – SUMP PUMPS**PART 1 GENERAL****1.1. SUMMARY**

- A. This Section includes wet-pit-mounted, vertical and submersible sump pumps and accessories, inside the building, for building storm drainage systems.

1.2. SUBMITTALS

- A. Product Data: For each type and size of sump pump specified. Include certified performance curves with operating points plotted on curves, and rated capacities of selected models, furnished specialties, and accessories.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and maintenance data.

1.3. QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 PRODUCTS**2.1. SUBMERSIBLE SUMP PUMPS**

- A. Manufacturers:
 - 1. ABS Pumps, Inc.
 - 2. Goulds Pumps; ITT Industries.
 - 3. Grundfos Pumps Corp.
 - 4. Liberty Pumps.
 - 5. Little Giant Pump Co.
 - 6. Paco Pumps, Inc.
 - 7. Stancor, Inc.
 - 8. Weil Pump Company, Inc.
 - 9. Zoeller Company.
- B. Description: Factory-assembled and tested, simplex or duplex as scheduled, single-stage, centrifugal, end-suction, submersible, direct-connected sump pumps complying with UL 778 and HI 1.1-1.2 and HI 1.3 for submersible sump pumps.
- C. Casing: Cast iron; with cast-iron inlet strainer, legs that elevate pump to permit flow into impeller, and vertical discharge with companion flange for piping connection.
- D. Impeller: ASTM A 48/A 48M, Class No. 25 A or higher cast iron; statically and dynamically balanced, semiopen nonclog design, overhung, single suction, keyed and secured to shaft.
- E. Casing and Impeller: Cast iron casing with metal inlet strainer and brass, bronze, or cast-iron impeller.
- F. Casing and Impeller: Cast iron or plastic casing with inlet strainer and metal or plastic impeller.
- G. Pump and Motor Shaft: Stainless steel with factory-sealed, grease-lubricated ball bearings and single-mechanical seals.
- H. Motor: Hermetically sealed, capacitor-start type, with built-in overload protection; three-conductor waterproof power cable of length required, and with grounding plug and cable-sealing assembly for connection at pump. Comply with requirements in Division 22 Section "Common Motor Requirements for Plumbing Equipment"
- I. Pump Discharge Piping: Factory or field fabricated, ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe.
- J. Basin Cover: Cast iron or steel with bituminous coating and strong enough to support controls.
- K. Controls: NEMA 250, Type 1 enclosure, pedestal-mounted float switch; with float, float rod, and

rod buttons. Include automatic alternator to alternate operation of pump units on successive cycles and to operate multiple units if one pump cannot handle load.

- L. Controls: NEMA 250, Type 6, 120-V ac, float switch, mounted on discharge piping and alarm for simplex pumps.

2.2. SUBMERSIBLE SUMP PUMPS FOR USE IN ELEVATOR SUMPS

- A. Provide submersible pump as specified above and provide control systems capable of pumping water while containing oil. The system shall function automatically and shall provide for an alarm in the event of (a) the presence of oil in the sump (b) high liquid in the sump or (c) high amps or a locked rotor condition. An alarm that sounds only in the event of a high liquid condition shall not be acceptable.

1. CONTROLS:

- a. The control shall be approved to UL 508 standards and housed in a gasketed Nema 4X enclosure with stainless steel hinged hardware and 8-pin twist-lock electrical receptacle. The control shall include dual "Oil-Minder Relays" with variable sensitivity settings, magnetic contactor with separate over-current relay, self-cleaning stainless steel sensor probe, high decibel warning horn with illuminated red light and alarm silencing switch, dual floats, clearly marked terminal board and remote monitoring contact. A Nema 4X box with 8-pin twist-lock electrical receptacle and 25' (additional lengths available) of mating cable shall be provided. All cables between the pump and junction box shall be 16' long and the cable and plug from the control unit shall be 8' long. The control unit, pump, floats and sensor probe shall be factory assembled as a complete, ready to use system and shall be tested and approved by a nationally recognized testing laboratory such as ENTELA.

2.3. SUMP PUMP BASINS

- A. Description: Factory fabricated basin with sump, pipe connections, and separate cover.
- B. Sump: Fabricate watertight, with sidewall openings for pipe connections.
 - 1. Material: Fiberglass.
 - 2. Reinforcement: Mounting plates for pumps, fittings, and accessories.
 - 3. Anchor Flange: Same material as or compatible with sump, cast in or attached to sump, in location and of size required to anchor basin in concrete slab.
- C. Cover: Fabricate with openings having gaskets, seals, and bushings, for access to pumps, pump shafts, control rods, discharge piping, vent connections, and power cables.
 - 1. Material: Cast iron or steel with bituminous coating.
 - 2. Reinforcement: Steel or cast iron, capable of supporting foot traffic for basins installed in foot-traffic areas.

PART 3 EXECUTION

3.1. CONCRETE

- A. Install concrete bases of dimensions indicated for pumps and controllers. Refer to Division 22 Section "Common Work Results for Plumbing."
 - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.
 - 2. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 3. Install anchor bolts to elevations required for proper attachment to supported equipment.
- B. Cast-in-place concrete materials and placement requirements are specified in Division 03.

3.2. SUMP PUMP INSTALLATION

- A. Install sump pumps according to applicable requirements in HI 1.4.
- B. Install pumps and arrange to provide access for maintenance including removal of motors, impellers, couplings, and accessories.
- C. Set submersible sump pumps on basin or pit floor. Make direct connections to storm drainage piping.
- D. Install sump pump basins and connect to drainage piping. Brace interior of basins according to manufacturer's written instructions to prevent distortion or collapse during concrete placement. Set basin cover and fasten to basin top flange. Install cover so top surface is flush with finished floor.
- E. Construct sump pump pits and connect to drainage piping. Set pit curb frame recessed in and anchored to concrete. Fasten pit cover to pit curb flange. Install cover so top surface is flush with finished floor.
- F. Support piping so weight of piping is not supported by pumps.
- G. Install piping adjacent to sump pumps to allow service and maintenance.
- H. Connect storm drainage piping to pumps.
 - 1. Install flexible connectors adjacent to pumps in discharge piping.
 - 2. Install check and shutoff valves on discharge piping from each pump. Install unions on pumps having threaded pipe connections. Install valves same size as connected piping.
- I. Ground equipment according to Division 26.
- J. Connect wiring according to Division 26.

END OF SECTION 221429

SECTION 230010 – MECHANICAL PROVISIONS**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. All contract documents including drawings, alternates, addenda and modifications and general provisions of the Contract, including General and Supplementary Conditions and all other Division Specification Sections, apply to work of this section. All preceding and following sections of this specification division are applicable to the Mechanical Contractor, all sub-contractors, and all material suppliers.

1.2. SCOPE OF WORK

- A. This DIVISION requires the furnishing and installing of complete functioning Mechanical systems, and each element thereof, as specified or indicated on Drawings or reasonably inferred, including every article, device or accessory reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the Work include materials, labor, supervision, supplies, equipment, transportation, and utilities.
- B. In case of an inconsistency between the Drawings and Specifications or within either document, the better quality or the greater quantity of work shall be provided in accordance with the Architect or Engineer's interpretation.
- C. Refer to Architectural, Structural and Electrical Drawings and all other contract documents and to relevant equipment drawings and shop drawings to determine the extent of clear spaces and make all offsets required to clear equipment, beams and other structural members to facilitate concealing piping and ductwork in the manner anticipated in the design.

1.3. SPECIFICATION FORM AND DEFINITIONS

- A. The Engineer indicated in these specifications is Pearson Kent McKinley Raaf Engineers LLC. 13300 W 98th Street, Lenexa, KS 66215, PHONE 913-492-2400, EMAIL admin@pkmreng.com.
- B. Contractor, wherever used in these specifications, shall mean the Company that enters into contract with the Owner to perform this section of work.
- C. When a word, such as "proper", "satisfactory", "equivalent", and "as directed", is used, it requires the Architect-Engineer's review.
- D. "PROVIDE" means to supply, purchase, transport, place, erect, connect, test, and turn over to Owner, complete and ready for regular operation, the particular Work referred to.
- E. "INSTALL" means to join, unite, fasten, link, attach, set up, or otherwise connect together before testing and turning over to Owner, complete and ready for regular operation, the particular Work referred to.
- F. "FURNISH" means to supply all materials, labor, equipment, testing apparatus, controls, tests, accessories, and all other items customarily required for the proper and complete application for the particular Work referred to.
- G. "WIRING" means the inclusion of all raceways, fittings, conductors, connectors, tape, junction and outlet boxes, connections, splices, and all other items necessary and/or required in connection with such Work.
- H. "CONDUIT" means the inclusion of all fittings, hangers, supports, sleeves, etc.
- I. "AS DIRECTED" means as directed by the Architect/Engineer, or his representative.
- J. "CONCEALED" means embedded in masonry or other construction, installed behind wall furring or within double partitions, or installed above hung ceilings.

1.4. QUALIFICATIONS

- A. The contractors responsible for work under this section shall have completed a job of similar scope and magnitude within the last 3 years. The contractors shall employ an experienced, competent and adequate work force licensed in their specific trade and properly supervised at all times. Unlicensed workers and general laborers shall be adequately supervised to insure competent and

quality work and workmanship required by this contract and all other regulations, codes and practices. At all times the contractors shall comply with all applicable local, state and federal guidelines, practices and regulations. Contractor may be required to submit a statement of qualifications upon request before any final approval and selection. Failure to be able to comply with these requirements is suitable reason for rejection of a bid.

1.5. LOCAL CONDITIONS

- A. The contractor shall visit the site and determine the existing local conditions affecting the work required. Failure to determine site conditions or nature of existing or new construction will not be considered a basis for granting additional compensation.

1.6. CONTRACT CHANGES

- A. Changes or deviations from the contract documents; including those for extra or additional work must be submitted in writing for review of Architect-Engineer. No verbal change orders will be recognized.

1.7. LOCATIONS AND INTERFERENCES

- A. Locations of equipment, piping and other mechanical work are indicated diagrammatically by the mechanical drawings. The Contractor shall determine the exact locations on site, subject to structural conditions, work of other Contractors, and access requirements for installation and maintenance to approval of Architect-Engineer. Provide additional piping and ductwork offsets as required at no additional cost.
- B. Study and become familiar with the contract drawings of other trades and in particular the general construction plans and details in order to obtain necessary information for figuring installation. Cooperate with other contractors and install work in such a way as to avoid interference with their work. Minor deviations, not affecting design characteristics, performance or space limitation may be permitted if reviewed prior to installation by Architect-Engineer.
- C. Any pipe, ductwork, equipment, apparatus, appliance or other item interfering with proper placement of other work as indicated on drawings, specified, or required, shall be removed, relocated and reconnected without extra cost. Damage to other work caused by this Contractor, the Subcontractor, or workers shall be restored as specified for new work.
- D. Do not scale mechanical and electrical drawings for dimensions. Contractor shall accurately layout work from the dimensions indicted on the Architectural drawings unless they are found to be in error.

1.8. PERFORMANCE

- A. Final acceptance of work shall be subject to the condition that all systems, equipment, apparatus and appliances operate satisfactorily as designed and intended. Work shall include required adjustment of systems and control equipment installed under this specification division.
- B. The Contractor warrants to the Owner and Architect-Engineer the quality of materials, equipment, workmanship and operation of equipment provided under this specification division for a period of one year from and after completion of building and acceptance of mechanical systems by Owner.

1.9. WARRANTY

- A. The Contractor warrants to the Owner and Architect-Engineer that upon notice from them within a one year warranty period following date of acceptance, that all defects that have appeared in materials and/or workmanship, will be promptly corrected to original condition required by contract documents at Contractor's expense.
- B. Warranty for all equipment shall take effect from the date of substantial completion regardless of the date equipment was installed.
- C. The above warranty shall not supersede any separately stated warranty or other requirements required by law or by these specifications.

1.10. ALTERNATES

- A. Refer to General Requirements for descriptions of any alternates that may be included.

1.11. MATERIALS, EQUIPMENT AND SUBSTITUTIONS

- A. The intent of these specifications is to allow ample opportunity for Contractor to use his ingenuity and abilities to perform the work to his and the Owner's best advantage, and to permit maximum competition in bidding on standards of materials and equipment required.
- B. Material and equipment installed under this contract shall be first class quality, new, unused and without damage.
- C. In general, these specifications identify required materials and equipment by naming one or more manufacturer's brand, model, catalog number and/or other identification. The first named manufacturer or product is used as the basis for design; other manufacturers named must furnish products consistent with specifications of first named product as determined by Engineer. Base bid proposal shall be based only on materials and equipment by manufacturers named, except as hereinafter provided.
- D. Where materials or equipment are described but not named, provide required items of first quality, adequate in every respect for intended use. Such items shall be submitted to Architect-Engineer for review prior to procurement.
- E. Materials and equipment proposed for substitutions shall be equal to or superior to that specified in construction, efficiency, utility, aesthetic design, and color as determined by Architect-Engineer whose decision shall be final and without further recourse. Physical size of substitute brand shall be no larger than space provided including allowances for access for installation and maintenance. Requests must be accompanied by two copies of complete descriptive and technical data including manufacturer's name, model and catalog number, photographs or cuts, physical dimensions, operating characteristics and any other information needed for comparison.
- F. If the Contractor wishes to incorporate products other than those named in the Base Bid Specifications they shall submit a request for approval of equivalency in writing no later than (10) ten calendar days prior to bid date. Substitutions after this may be refused at Engineers option. Equivalentents will ONLY be considered approved when listed by addendum.
- G. In proposing a substitution prior to or subsequent to receipt of bids, include in such bid the cost of altering other elements of this project, including adjustments in mechanical or electrical service requirements necessary to accommodate such substitution.
- H. Within 10 working days after bids are received, the apparent low bidder shall submit to the Architect-Engineer for approval, three copies of a list of all major items of equipment they intend to provide. Within 30 working days after award of Contract, Contractor shall submit shop drawings for equipment and materials to be incorporated in work, for Architect-Engineer review. Where 30-day limit is insufficient for preparation of detailed shop drawings on major equipment or assemblies, Contractor shall submit manufacturer's descriptive catalog data and indicate date such detailed shop drawings will be submitted along with manufacturer's certification that order was placed within 30 working day limit.

1.12. ELECTRONIC PLAN FILES

- A. Electronic files of the contract documents may be available from the Engineer to successful bidders and manufacturers for a fee of \$50 per sheet, \$100 minimum and \$25 email/shipping charge. A release of liability form will be required along with payment prior to release of files.

1.13. OPENINGS, ACCESS PANELS AND SLEEVES

- A. This Contractor shall include the installation of all boxes, access panels and sleeves for openings required to install this work, except structural openings incorporated in the structural drawings. Sleeves shall be installed for all pipes passing through structural slabs and walls. Contractor shall set and verify the location of sleeves that pass through beams, as shown on structural plans. All floor and wall penetrations shall be sealed to meet fire-rating requirements.
- B. All penetrations through interior or exterior and rated or non-rated walls and floors shall be

appropriately sealed prevent entry and movement of rodents and insects. Contractor shall coordinate their work with all other trades.

1.14. ARCHITECTURAL VERIFICATION AND RELATED DOCUMENTS

- A. Contractor shall consult all Architectural Drawings and specifications in their entirety incorporating and certifying all millwork, furniture, and equipment rough-in including utility characteristics such as voltage, phase, amperage, pipe sizes, duct sizes, including height, location and orientation. Shop drawings incorporating these requirements should be submitted to the Architect for approval prior to installation or rough in.

1.15. EXTENT OF CONTRACT WORK

- A. Provide mechanical systems indicated on drawings, specified or reasonably implied. Provide every device and accessory necessary for proper operation and completion of mechanical systems. In no case will claims for “Extra Work” be allowed for work about which Contractor could have been informed before bids were taken.
- B. Electrical work required to install and control mechanical equipment, which is not shown on plans or specified under Division 26, shall be included in Contractor’s base bid proposal. Mechanical systems and components are to be installed as a complete system, including all miscellaneous interlock (low voltage and minor line voltage power wiring such as control motors, limit switches, relays, etc), control wiring, safeties. Coordinate interlock to other systems such as fire alarm that interlock to mechanical systems and insure that provisions are made in equipment for connection of these systems. Coordinate with all other trades for specific needs and requirements based on submitted systems.
- C. Contractor shall become familiar with equipment provided by other contractors that require mechanical connections and controls.
- D. All automatic temperature control devices shall be mounted as indicated in automatic temperature control section of specifications.
- E. The cost of larger wiring, conduit, control and protective devices resulting from installation of equipment which was not used for basis of design as outlined in specifications shall be paid for by Mechanical Contractor at no cost to Owner or Architect-Engineer.
- F. Contractor shall be responsible for providing supervision to Electrical Contractor to insure that required connections, interlocking and interconnection of mechanical and electrical equipment are made to attain intended control sequences and system operation.
- G. Furnish four complete sets of electrical wiring diagrams to Architect-Engineer to be included in the maintenance manuals and three complete sets to Electrical Contractor. Diagrams shall show factory and field wiring of components and controls. Control devices and field wiring to be provided by Electrical Contractor shall be clearly indicated by notation and drawing symbols on wiring diagrams.
- H. Contractor shall obtain complete electrical data on mechanical shop drawings and shall list this data on an approved form that shall be presented monthly or on request, to Electrical Contractor. Data shall be complete with wiring diagrams received to date and shall contain necessary data on electrical components of mechanical equipment such as HP, voltage, amperes, watts, locked rotor current to allow Electrical Contractor to order electrical equipment required in his contract.

1.16. WORK NOT INCLUDED IN CONTRACT

- A. Consult Division 26 of specifications for work to be provided by Electrical Contractor in conjunction with installation of mechanical equipment.

1.17. CODES, RULES AND REGULATIONS

- A. Provide Work in accordance with applicable codes, rules and regulations of Local and State, Federal Governments and other authorities having lawful jurisdiction.
- B. Conform to latest editions and supplements of following codes, standards or recommended practices.

C. BUILDING CODES:

1. International Codes (Latest adopted version of applicable codes)

D. SAFETY CODES:

1. National Electrical Safety Code Handbook H30 - National Bureau of Standards.
2. Occupational Safety and Health Standard (OSHA) - Department of Labor.

E. NATIONAL FIRE CODES:

1. NFPA No. 70 National Electrical Code
2. NFPA No. 89M Clearances, Heat Producing Appliances
3. NFPA No. 90A Air Conditioning and Ventilating Systems
4. NFPA No. 101 Life Safety Code

F. UNDERWRITERS LABORATORIES INC:

1. All materials, equipment and component parts of equipment shall bear UL labels whenever such devices are listed by UL.

G. MISCELLANEOUS CODES:

1. ANSI A117.1 - Handicapped Accessibility
2. Applicable State Elevator Codes
3. Americans with Disabilities Act (ADA)

H. ENERGY EFFICIENCY REQUIREMENTS:

1. All mechanical systems and components shall be manufactured and installed in compliance with ASHRAE 90.1 – 2019 and latest adopted version of IECC.

1.18. STANDARDS

- A. Drawings and specifications indicate minimum construction standard. Should any work indicated be sub-standard to any ordinances, laws, codes, rules or regulations bearing on work, Contractor shall promptly notify Architect-Engineer in writing before proceeding with work so that necessary changes can be made. However, if the Contractor proceeds with work knowing it to be contrary to any ordinances, laws, rules, and regulations, Contractor shall thereby have assumed full responsibility for and shall bear all costs required to correct non-complying work.

1.19. PERMITS/FEES

- A. The Contractor shall secure and pay for necessary permits and certificates of inspection required by governmental ordinances, laws, rules or regulations. Keep a written record of all permits and inspection certificates and submit two copies to Architect-Engineer with request for final inspection.
- B. The Contractor shall include in their base bid any fees or charges by the local utility providers to establish new services to the structure. Coordinate with the utility suppliers to verify exactly which part of the work required for the new utility service, is to be performed by the contractor and which part will be supplied by the utility company.

PART 2 - PRODUCTS**2.1. Not Used****PART 3 - EXECUTION****3.1. SUBMITTALS**

- A. Contractor shall furnish submittals of all materials and equipment required by the specifications. Refer to each specification section for the submittals (if any) required for that section.
- B. Submittal format shall be as indicated below. Submittals not meeting these requirements will be returned without action for re-submittal.

1. Submittals shall be furnished in an Adobe PDF format.
 2. Submittals shall be per individual submittal section, as listed in the table of contents. All required submittals within that section shall be grouped together in a single submittal.
 - a. Furnishing submittals by division or by individual item may result in delayed reviewing of the submittal(s) due to additional administrative time required to process the large size and/or quantity of files.
 3. Submittals shall have a cover page containing the following information: The project name, the applicable specification section and paragraph, the submittal date, and the Contractor's stamp (see below for requirements).
 4. Mark each submitted item as applicable with scheduled mark, name, etc. corresponding to the plans.
 5. Where generic catalog cuts are submitted for review, conspicuously mark or provide schedule of equipment, capacities, controls, fitting sizes, etc. that are to be provided. Each catalog sheet shall bear the equipment manufacturer's name and address.
 6. Where equipment submitted does not appear in base specifications or specified equivalent, mark submittals with applicable alternate numbers, change order number or letters of authorization.
 7. All submittals on materials and equipment listed by UL shall indicate UL approval on submittal.
- C. Contractor review:
1. Contractor shall check all submittals to verify that they meet specifications and/or drawings requirements before forwarding submittals to the Architect-Engineer for their review. All submittals submitted to Architect-Engineer shall bear contractor's approval stamp that shall indicate that Contractor has reviewed submittals and that they meet specification and/or drawing requirements. Contractor's submittal review shall specifically check for but not be limited to the following: equipment capacities, physical size in relation to space allowed; electrical characteristics, provisions for supply, return and drainage connections to building systems. All submittals not meeting Contractor's approval shall be returned to their supplier for re-submittal.
 2. No submittals will be considered for review by the Architect-Engineer without Contractor's approval stamp, or that have extensive changes made on the original submittal as a result of the Contractor's review.
 3. Before submitting shop drawings and material lists, verify that all equipment submitted is mutually compatible and suitable for the intended use. Verify that all equipment will fit the available space and allow ample room for maintenance. If the size of equipment furnished makes necessary any change in location, or configuration, submit a shop drawing showing the proposed layout.
- D. Review Schedule:
1. The shop drawing / submittal dates shall be at least as early as required to support the project schedule and shall also allow for two weeks Architect-Engineer review time plus a duplication of this time for re-submittal if required.
 2. Submittal of all shop drawings as soon as possible after permitting approval but before construction starts is preferred.
 3. Approval of shop drawings submitted prior to receipt of a permit for that respective scope of work should be considered conditional pending review/approval of the construction documents by the AHJ. Changes required to the submittal as a result of permitting comments received after architect's/engineer's review shall not be a justification for a change in price.
 4. Any time delay caused by correcting and re-submitting submittals/shop drawings will be the Contractor's responsibility.

- E. The Architect's-Engineer's checking and subsequent review of such drawings, schedules, literature, or illustrations shall not relieve the Contractor from responsibility for deviations from Drawings or Specifications unless he has, in writing, called the Architect's-Engineer's attention to such deviations at the time of submission, and secured their written approval; nor shall it relieve the contractor from responsibility for errors in dimensions, details, size of members, or omissions of components for fittings; or for coordinating items with actual building conditions and adjacent work.
- F. Any corrections or modifications made by the Architect-Engineer shall be deemed acceptable to the Contractor at no change in price unless written notice is received by the Architect-Engineer prior to the performance of any work incorporating such corrections or modifications.
- G. Submittals that require re-submission shall have the items that were revised "flagged" or in some other manner marked to call attention to what has been changed.
- H. Coordination
 - 1. After shop drawings have been reviewed and approved by all parties, transmit a set of submittals to each other trade (eg Plumbing, Mechanical, Electrical, Controls, etc) that will interface with installation. Each other contractor shall review the submittal for coordination and return a stamped submittal indicating they have reviewed the submittal for coordination purposes.

3.2. SHOP DRAWINGS

- A. Shop drawings shall meet all of the above requirements for submittals.
- B. Contractor shall submit Adobe PDF sets of all fabrication drawings. Cost of drawing preparation, printing and distribution shall be paid for by the contractor and included in his base bid.
- C. No work shall be fabricated until Architect-Engineer's review has been obtained.

3.3. OPERATING AND MAINTENANCE INSTRUCTIONS (O & M MANUALS)

- A. Submit with shop drawings of equipment, four copies of installation, operating, maintenance instructions, and parts lists for equipment provided. Equipment manufacturer shall prepare instructions.
- B. Keep in safe place, keys and wrenches furnished with the equipment provided under this contract. Present to the Owner and obtain a receipt for them upon completion of project.
- C. Prepare a complete brochure, covering systems and equipment provided and installed under this contract. Submit brochures to Architect-Engineer for review before delivery to Owner. Brochures shall contain following:
 - 1. Certified equipment drawings/or catalog data with equipment provided clearly marked as outlined above.
 - 2. Record copy of all submittals indicating actual equipment installed indicating options, characteristics. Copies of submittals shall bear the stamps of all parties that reviewed submittals.
 - 3. Complete installation, operating, maintenance instructions and parts lists for each item of equipment.
 - 4. Special emergency operating instructions with a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to various parts of mechanical system.
- D. Provide brochures bound in three-ring binders with metal hinge. Reinforce binding edge of each sheet of loose-leaf type brochure to prevent tearing from continued usage. Clearly print on label insert of each brochure:
 - 1. Project name and address.
 - 2. Section of work covered by brochure, i.e., "Plumbing", etc.

3.4. RECORD DOCUMENTS

- A. During construction, keep an accurate record of all deviations between the work as shown on Drawings and that which is actually installed. Keep this record set of prints at the job site for review by the Architect/Engineer.
- B. Upon completion of the installation and acceptance by the owner, transfer all record drawing information to one neat and legible set of prints. Then deliver them to the Architect/Engineer for transmittal to the Owner.
- C. Provide one copy of on high quality heavy weight presentation type paper. Blueprints or other media which fade shall not be used.
- D. Provide one electronic scanned version of record documents in Adobe PDF format – PDFs may be submitted on electronic media (DVD, USB) or via an FTP or other file sharing site. Provide electronic copies in conjunction with hard copy documents.

3.5. CLEANING UP

- A. Contractor shall take care to avoid accumulation of debris, boxes, crates, etc., resulting from the installation of his work. Contractor shall remove from the premises each day all debris, boxes, etc., and keep the premises clean.
- B. Contractor shall clean up all ductwork and equipment at the completion of the project.
- C. All equipment, cabinets and enclosures shall be thoroughly vacuumed clean prior to energizing equipment and at the completion of the project. Equipment shall be opened for observation by the Architect/Engineer as required.

3.6. WATERPROOFING

- A. Avoid, if possible, the penetration of any waterproof membranes such as roofs, machine room floors, basement walls, and the like. If such penetration is necessary, perform it prior to the waterproofing and furnish all sleeves or pitch-pockets required. Advise the Architect/Engineer and obtain written permission before penetrating any waterproof membrane, even where such penetration is shown on the Drawings.
- B. If Contractor penetrates any walls or surfaces after they have been waterproofed, he shall restore the waterproof integrity of that surface as directed by the Architect/Engineer at his own expense

3.7. CUTTING AND PATCHING

- A. Contractor shall do cutting and patching of building materials required for installation of work herein specified. Remove walls, ceilings and floors (or portions thereof) necessary to accomplish scope of work. Do not cut or drill through structural members including wall, floors, roofs, and supporting structure, without the Architect's and Structural Engineer's approval and in a manner approved by them.
- B. Make openings in concrete with concrete hole saw or concrete drill. Use of star drill or air hammer for this work will not be permitted.
- C. Patching shall be by the contractors of the particular trade involved, shall match the existing construction type, quality, finish and texture, and shall meet approval of Architect-Engineer. Damage to building finishes, caused by installation of mechanical work shall be repaired at Contractor's expense to approval of Architect-Engineer.

3.8. SETTING, ADJUSTMENT AND EQUIPMENT SUPPORTS

- A. Work shall include mounting, alignment and adjustment of systems and equipment. Set equipment level on adequate foundation and provide proper anchor bolts and isolation as shown, specified or required by manufacturers in installation instructions. Level, shim and grout equipment bases as recommended by manufacturer. Mount motors, align and adjust drive shafts and belts according to manufacturer's instructions.
- B. Equipment failures resulting from improper installation or field alignment shall be repaired or replaced by Contractor at no cost to Owner.
- C. Floor or pad mounted equipment shall not be held in place solely by its own dead weight. Include

anchor fastening in all cases.

- D. Provide floor or slab mounted equipment with 3-1/2” high concrete bases unless specified otherwise. Mechanical contractor shall form all pads; General contractor shall provide and place all concrete and reinforcing for said pads. Individual concrete pad shall be no less than 4” wider and 4” longer than equipment, and shall extend no less than 2” from each side of equipment.
- E. Provide each piece of equipment or apparatus suspended from ceiling or mounted above floor level with suitable structural support, platform or carrier in accordance with best-recognized practice. Verify that structural members of buildings are adequate to support equipment and unless otherwise indicated on plans or specified, arrange for their inclusion and attachment to building structure. Provide hangers with vibration isolators.
- F. Submit details of hangers, platforms and supports together with total weights of mounted equipment to Architect-Engineer for review before proceeding with fabrication or installation.

3.9. START-UP, CHANGEOVER, TRAINING AND OPERATIONAL CHECK

- A. Contractor shall perform the initial start-up of the systems and equipment and shall provide necessary supervision and labor to make the first seasonal changeover of systems. Personnel qualified to start-up and service this equipment, including manufacturer's technicians, and the Owner's operating personnel shall be present during these operations.
- B. Contractor shall be responsible for training Owner's operating personnel to operate and maintain the systems and equipment installed. Keep a record of training provided to Owner's personnel listing the date, subject covered, instructors name, names of Owner's personnel attending and total hours of instruction given each individual.
- C. All owner-training sessions shall be orderly and well organized and shall be video recorded digitally. At the end of the owner training, the “training” session recording shall be transmitted to the owner via DVD and shall become property of the owner.

3.10. FINAL CONSTRUCTION REVIEW

- A. At final construction review, each respective Contractor and major subcontractors shall be present or shall be represented by a person of authority. Each Contractor shall demonstrate, as directed by the Architect-Engineer, that the work complies with the purpose and intent of the contract documents. Respective Contractor shall provide labor, services, instruments or tools necessary for such demonstrations and tests.

END OF SECTION 230010

SECTION 230011 – BASIC MECHANICAL MATERIALS AND METHODS**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 230010.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Provide documentation of all completed tests described herein and their results.

PART 2 – PRODUCTS (NOT APPLICABLE)**PART 3 - EXECUTION****3.1. TESTING PROCEDURES FOR PIPING SYSTEMS**

- A. Test all lines and systems before they are insulated, painted or concealed by construction or backfilling. Provide fuel, water, electricity, materials, labor and equipment required for tests.
- B. Where entire system cannot be tested before concealment, test system in sections. Verify that system components are rated for maximum test pressures to be applied. Where specified test pressures exceed component ratings, remove or isolate components from system during tests. Upon completion, each system shall be tested as an entire system.
- C. Repair or replace defects, leaks and material failures revealed by tests and then retest until satisfactory. Make repairs with new materials.
- D. All systems shall hold scheduled test pressures for specified time without loss of initial test pressure.
- E. Upon completion of testing submit five copies of a typewritten report to A/E. Report shall list systems tested, test methods, test pressures, holding time and all failures with corrective action taken.
- F. For test pressure schedules see piping material schedules.

3.2. TESTING OF REFRIGERANT LINES

- A. After the system is installed and before any piping is insulated, the entire refrigeration circuit must be thoroughly leak tested. Test all pipe joints for leaks. Make certain that all joints are inspected thoroughly. Mark carefully any spots where leaks occur.
- B. Leaks are repaired by disassembling the connection, cleaning the fitting and remaking. No attempt should be made to repair a leak by simply adding brazing material.

3.3. MISCELLANEOUS CONTROL WIRING

- A. All control wiring regardless of voltage shall be routed in a concealed manner.
- B. All exterior control wiring shall be installed in conduit.
- C. Wiring to thermostats and other wall mounted devices and sensors shall be routed in ¾" conduit to backboxes in walls and to an accessible ceiling or location.
- D. All conduit and wiring shall be installed in accordance with Division 26.
- E. Cabling and circuiting shall be plenum rated where required.
- F. Refer to additional specifications where systems and controls are specified as DDC or similar.

3.4. CLEANING OF SYSTEMS AND EQUIPMENT

- A. After pressure testing of systems and equipment and before operational test thoroughly clean interiors of piping and equipment. Clean equipment as recommended by equipment manufacturers. Where specific instructions are not provided clean equipment systems as follows:
 - 1. Air Handling Systems:

- a. Before starting any air system clean all debris, foreign matter and construction dirt from air system and fan. Provide equipment requiring filters, such as air handling units, fan coil units, blower, etc., with throw-away filters. After cleaning air system install temporary filters and run continuously for a minimum of eight hours at full volume before installing permanent filters. Provide temporary throw-away filters in all permanent heating and air conditioning equipment systems being utilized during construction. Prior to testing and balancing systems remove temporary filter media and install clean unused filters of the type specified. Clean filters shall be installed in equipment by mechanical contractor before final acceptance inspection by Architect and Engineer.

3.5. MAINTENANCE OF SYSTEMS

- A. Contractor shall be responsible for operation, maintenance and lubrication of equipment installed under this contract.
- B. Keep a complete record of equipment maintenance and lubrication and submit two copies with request for final construction review.
- C. Records shall indicate types of lubricants used and date or time when next maintenance or lubrication will need to be performed by Owner. Where special lubricants are required, Contractor shall provide Owner with a one year supply as determine by Equipment Manufacturer's recommendations.

3.6. PAINTING OF MATERIALS AND EQUIPMENT

- A. Touch-up painting and refinishing of factory applied finishes shall be by Mechanical Contractor. Contractor shall be responsible for obtaining proper type of painting materials and color from equipment manufacturer.
- B. Unless specified otherwise factory built equipment shall be factory painted. Paint shall be applied over surfaces only after they have been properly cleaned and coated with a corrosion resistant primer.
- C. After installation, damage to painted surfaces shall be properly prepared and primed with primers equal to factory materials. Finish coating shall be same color and type as factory finish.
- D. Where extensive refinishing is required equipment shall be completely repainted.

3.7. EXCAVATION AND BACKFILL

- A. Perform necessary excavation to receive Work. Provide necessary sheathing, shoring, cribbing, tarpaulins, etc. for this operation, and remove it at completion of work. Perform excavation in accordance with appropriate section of these specifications, and in compliance with OSHA Safety Standards.
- B. Excavate trenches of sufficient width to allow ample working space, and no deeper than necessary for installation work.
- C. Conduct excavations so no walls or footings are disturbed or injured. Backfill excavations made under or adjacent to footing with selected earth or sand and tamp to compaction required by Architect-Engineer. Mechanically tamp backfill under concrete and pavings in six inch layers to 95% standard density, Reference Division 2.
- D. Backfill trenches and excavations to required heights with allowance made for settlement. Tamp fill material thoroughly and moistened as required for specified compaction density. Dispose of excess earth, rubble and debris as directed by Architect.
- E. When available, refer to test hole information on Architectural or Civil drawings or specifications for types of soil to be encountered in excavations.

3.8. FIRE BARRIERS

- A. General
 1. For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that

are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

B. Submittals

1. Product Data: For Each Type Of Product Indicated.
 2. Shop Drawings: For Each Through-Penetration Firestop System, Show Each Type Of Construction Condition Penetrated, Relationships To Adjoining Construction, And Type Of Penetrating Item. Include Firestop Design Designation Of Qualified Testing And Inspecting Agency That Evidences Compliance With Requirements For Each Condition Indicated.
 - a. Submit Documentation, Including Illustrations, From A Qualified Testing And Inspecting Agency That Is Applicable To Each Through-Penetration Firestop System Configuration For Construction And Penetrating Items.
 - b. Where Project Conditions Require Modification To A Qualified Testing And Inspecting Agency's Illustration For A Particular Through-Penetration Firestop Condition, Submit Illustration, With Modifications Marked, Approved By Through-Penetration Firestop System Manufacturer's Fire-Protection Engineer As An Engineering Judgment Or Equivalent Fire-Resistance-Rated Assembly.
 3. Through-Penetration Firestop System Schedule: Indicate Locations Of Each Through-Penetration Firestop System, Along With The Following Information:
 - a. Types Of Penetrating Items.
 - b. Types Of Constructions Penetrated, Including Fire-Resistance Ratings And, Where Applicable, Thicknesses Of Construction Penetrated.
 - c. Through-Penetration Firestop Systems For Each Location Identified By Firestop Design Designation Of Qualified Testing And Inspecting Agency.
- C. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.
- D. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- E. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- F. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by building inspector, if required by authorities having jurisdiction.
- G. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.
- H. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- I. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.
- J. Provide sleeves through all fire-rated walls and fill voids surrounding sleeves and interior to sleeves around piping with Nelson "Flameseal" fire stop putty with U.L. listed 3 hour rating installed as per manufacturers recommendations.
- K. Equivalent by Hilti, Inc., Johns Manville, Nelson Firestop Products, NUCO Inc., RectorSeal Corporation, Specified Technologies Inc., 3M, Tremco, USG, Dow, Chemelex.

3.9. EQUIPMENT ANCHORS

- A. Provide floor or foundation mounted equipment such as pumps, boilers, air handling units, etc. with Decatur Engineering Company concrete anchors.
- B. Where equipment anchors cannot be installed during forming of floors or foundations anchor equipment with McCulloch Kwik-Bolt concrete anchors.
- C. Anchors shall be proper type and size recommended by manufacturer for equipment to be anchored.

3.10. WELDING

- A. Contractor shall be responsible for quality of welding and suitability of welding procedures. All welding shall be in accordance with American Welding Society Standard B3.0 and ANSI Standard B31.1.
- B. Welded pipe joints shall be made by certified welding procedures and welders. Welding electrodes shall be type and material recommended by electrode manufacturer for materials to be welded. All pipe and fittings ends shall be beveled a minimum of 30 degrees prior to welding.
- C. Only welders who have successfully passed welder qualifications tests in previous 12 months for type of welding required shall do welding. Each welder shall identify his work with a code marking before starting any welded pipe fabrication. Contractor shall submit three copies of a list of welders who will work on project listing welders' code, date and types of latest qualification test passed by each welder.
- D. Welded joints shall be fusion welded in accordance with Level AR3 of American Welding Society Standard AWS D10.9 "Standard for Qualification of Welding Procedures and Welders for Pipe and Tubing". Welders qualified under National Certified Pipe Welding Bureau will be acceptable.
- E. Bevel all piping and fittings in accordance with recognized standards by flame cutting or mechanical means. Align and position parts so that branches and fittings are set true. Make changes in direction of piping systems with factory made welding fittings. Make branch connections with welding tees or forged weldolets.

END OF SECTION 230011

SECTION 230013 – PROJECT COORDINATION**PART 1 GENERAL****1.1. RELATED DOCUMENTS**

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

1.2. SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination Drawings.
 - 2. Administrative and supervisory personnel.
 - 3. Project meetings.
 - 4. Requests for Interpretation (RFIs).
- B. Each related sub-contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.

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, that 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. 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. Delivery and processing of submittals.
 - 2. Progress meetings.
 - 3. Preinstallation conferences.
 - 4. Project closeout activities.
 - 5. Startup and adjustment of systems.

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.
 - 1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination

Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:

- a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate required installation sequences.
 - c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
2. Sheet Size: At least 8-1/2 by 11 inches but no larger than 30 by 40 inches. Format shall be PDF or other electronic format to facilitate multiple user commenting and sharing easily.
 3. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including project managers, superintendent and other personnel in attendance at Project site to the General Contractor and other major subcontractors. Identify individuals and their duties and responsibilities; list email addresses and telephone numbers. Update the list as required during the project if personnel change.

1.5. COORDINATION

- A. Certain materials will be provided by other trades. Examine the Contract Documents and reviewed record Submittals to ascertain these general requirements. Contract Documents reflect a basis of design and may not reflect actual equipment or items being utilized.
- B. Carefully check space requirements with other trades and the physical confines of the area to insure that all material can be installed in the spaces allotted thereto including finished suspended ceilings and the spaces within the existing building. Make modifications thereto as required and approved.
- C. Transmit to other trades all information required for work to be provided under their respective Sections in ample time for installation.
- D. Wherever work interconnects with work of other trades, coordinate with other trades to insure that all trades have the information necessary so that they may properly install all the necessary connections and equipment. Identify all items of work that require access so that the ceiling trade will know where to install access doors and panels.
- E. Obtain equipment submittal information for all pieces of equipment to be connected to from other trades that clearly indicates all connection requirements, locations, sizes, and similar requirements. Obtain this information in ample time to coordinate other trade submittals and equipment coordination. Where requirements differ from that on plans or differs from provisions made in the work, immediately notify the Architect/Engineer. Do not proceed with work that is incompatible with equipment provided.
- F. Coordinate, project and schedule work with other trades in accordance with the construction sequence.
- G. Coordinate with the local Utility Companies to their requirements for service connections and provide all necessary materials, labor and testing.
- H. Coordinate with contractors for work under other Divisions of this specification for all work necessary to accomplish this contractor's work.
- I. Conduct a coordination meeting after reviewing all other trade coordination drawings with other relevant trades. This meeting shall be held to prevent conflicts during construction. Each major relevant subcontractor shall attend this meeting. Report any potential conflicts or clearance problems to Architect/Engineer after meeting.
- J. Adjust location of piping, ductwork, conduit, wiring, etc. to prevent interferences, both anticipated and encountered. Determine the exact route and location of each item prior to fabrication.

1. Right-of-Way:
 - a. Lines that pitch have the right-of-way over those that do not pitch. For example: steam, condensate, and plumbing drains normally have right-of way. Lines whose elevations cannot be changed to have right-of-way over lines whose elevations can be changed.
 - b. Make offsets, transitions and changes in direction in raceways as required to maintain proper headroom in pitch of sloping lines whether or not indicated on the Drawings.

1.6. DRAWINGS AND FILES.

- A. The Drawings show only the general run of MEP systems, equipment, fixtures, piping and ductwork and other components as well as approximate location of items such as outlets, switches, diffusers, lights, and equipment connections, etc. Coordinate all exact locations of items with other trades, architectural elevations, equipment requirements, owner requirements, ceilings, access, serviceability, etc. All such modifications and coordination shall be made without additional cost to the Owner. Any significant changes in location of items necessary in order to meet field conditions shall be brought to the immediate attention of the Architect/Engineer and receive his approval before such alterations are made
- B. Wherever the work is of sufficient complexity, additional Detail Drawings to scale similar to that of the bidding Drawings, prepared on tracing medium of the same size as Contract Drawings. With these layouts, coordinate the work with the work of other trades. Such detailed work to be clearly identified on the Drawings as to the area to which it applies. Submit for review Drawings clearly showing the work and its relation to the work of other trades before commencing shop fabrication or erection in the field. Attend meetings with other trades to review all documents.
- C. When directed by the General Contractor for areas of necessary coordination provide 3D building modelling coordination files and documents with other trades. Transmit information electronically and attend meetings as directed by the G/C as well as take part in coordination activities and documentation. Contractor shall be required to generate their own electronic files for this process.

1.7. PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.

- e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Possible conflicts.
 - i. Compatibility problems.
 - j. Time schedules.
 - k. Manufacturer's written recommendations.
 - l. Warranty requirements.
 - m. Compatibility of materials.
 - n. Space and access limitations.
 - o. Regulations of authorities having jurisdiction.
 - p. Testing and inspecting requirements.
 - q. Installation procedures.
 - r. Coordination with other work.
 - s. Required performance results.
 - t. Protection of adjacent work.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to 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.
- C. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contractor is on time, ahead or behind schedule, in relation to Construction Schedule. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time. Discuss impact of various contractor schedules upon other contractors and how to remedy impacts.
 - b. Review present and future needs of each contractor present, including the following:
 - i. Interface requirements.
 - ii. Sequence of operations.
 - iii. Status of submittals.
 - iv. Deliveries.
 - v. Off-site fabrication.
 - vi. Access.
 - vii. Quality and work standards.
 - viii. Change Orders.
 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to

others affected by decisions or actions resulting from each meeting.

1.8. REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI.
 - 1. Submit Contractor's suggested solution(s) to RFI. If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - 2. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION 220013

SECTION 230505 – MECHANICAL DEMOLITION**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 220500.
- B. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUMMARY

- A. This Section requires the selective removal and subsequent offsite disposal of the following:
 - 1. Mechanical and electrical equipment, devices, piping, conduits, ductwork, insulation, lighting, etc in existing building indicated on drawings and as required to accommodate new construction.
 - 2. Removal of MEP items in interior partitions as indicated on drawings.
 - 3. Removal and protection of existing fixtures, materials, and equipment items indicated to be removed, salvaged, relocated, reinstalled, etc.

1.3. SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Schedule indicating proposed sequence of operations for selective demolition work to Architect for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
 - 1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
 - 2. Coordinate with Owner's continuing occupation of portions of existing building and with Owner's partial occupancy of completed remodeled areas.
- C. Photographs of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with Architect prior to start of work.

1.4. JOB CONDITIONS

- A. Occupancy:
 - 1. Owner will occupy portions of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in such a manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities that will affect Owner's normal operations.
- B. Condition of Structures:
 - 1. Owner assumes no responsibility for actual condition of items or structures to be demolished. Conditions existing at time of Contractor's inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.
 - 2. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed. Storage or sale of removed items on site will not be permitted.
 - 3. Protections: Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.
 - 4. Provide protective measures as necessary and required to provide free and safe passage of Owner's personnel and general public to any occupied portions of building.

5. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain.
 6. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
 7. Construct temporary insulated dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks.
 8. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
 9. Remove protections at completion of work.
- C. Damages:
1. Promptly repair damages caused to adjacent facilities by demolition work.
- D. Traffic:
1. Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- E. Flame Cutting:
1. Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations.
- F. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
- G. Maintain fire protection services during selective demolition operations.
- H. Environmental Controls:
1. Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing and/or approved regulations pertaining to environmental protection. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1. PREPARATION

- A. General:
1. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
 2. Cease operations and notify Architect immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
- A. Provide all necessary temporary supports of items and systems to remain that were supported from

or otherwise affected by removal of other building components. Maintain integrity of all systems to remain and protect during the construction process.

- B. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to any occupied portions of the building.
- C. Where selective demolition occurs immediately adjacent to any occupied portions of the building, construct dust-proof partitions of minimum 4-inch studs, 5/8-inch drywall (joints taped) on occupied side, 1/2-inch fire-retardant plywood on demolition side. Fill partition cavity with sound-deadening insulation as required by Architect.
 - 1. Provide weatherproof closures for exterior openings resulting from demolition work.
- D. Locate, identify, stub off, and disconnect utility services that are not indicated to remain. Provide bypass connections as necessary to maintain continuity of service to any occupied areas of building. Provide minimum of 72 hours advance notice to Architect if shutdown of service is necessary during changeover.

3.2. DEMOLITION

- A. General:
 - 1. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.
- B. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.
- C. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
- D. Provide services for effective air and water pollution controls as required.
- E. Completely fill below-grade areas and voids resulting from demolition work. Provide fill consisting of approved earth, gravel, or sand, free of trash and debris, stones over 6 inches in diameter, roots, or other organic matter.
- F. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to architect in written accurate detail. Pending receipt of directive from Architect, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.3. SALVAGED MATERIALS

- A. Salvaged Items: Where indicated on Drawings as "Salvage - Deliver to Owner," carefully remove indicated items, clean, store, and turn over to Owner and obtain a receipt.

3.4. DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove debris, rubbish, and other materials resulting from demolition operations from building site. Transport and legally dispose off site.
- B. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
- C. Burning of removed materials is not permitted on Project site.

3.5. CLEANUP AND REPAIR

- A. General:
 - 1. Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled

or damaged by selective demolition work.

END OF SECTION 230505

SECTION 230513 – COMMON MOTOR REQUIREMENTS FOR HVAC SYSTEMS**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 230010.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

PART 2 - PRODUCTS**2.1. MOTORS**

- A. Motors shall be installed in strict accordance with rules set forth by NEC and equipment manufacturer.
- B. ELECTRIC MOTORS (Less than ½ HP)
 - 1. Motors 1/3 horsepower and smaller shall be selected by manufacturer of driven equipment with motor speed and torque characteristics best suited for application.
 - 2. Motors shall have a minimum service factor of 1.15 for open dripproof enclosure and 1.00 for totally enclosed motors. Wherever applicable provide motors with cushion bases. Motor enclosure shall be proper type required for operating environment.
 - 3. Motors shall have a plus or minus 10% voltage tolerance and plus or minus 5% frequency tolerance. Motors shall operate satisfactorily in ambient temperature range of 0 degrees C (32°F) to 140°C (104°F) at altitudes below 3300 feet.
 - 4. Provide motors with built-in thermal overload protection. Motors readily accessible to operating personnel shall have manual reset protector. All other shall have automatic reset protectors.
 - 5. Motors shall have AFBMA standard double-shielded ball bearings sized for average life of at least 100,000 hours under normal loading conditions. Bearings housing shall have provisions for adding new lubricant without major disassembly and shall have seals to prevent entrance of foreign matter and leakage of bearing lubricant.
 - 6. Motor bolts, screws and other external hardware shall be treated with corrosion resistant plating and motor enclosure prime painted with corrosion resistant metal primer finished with a durable machinery enamel.
 - 7. Unless indicated otherwise motors shall be rated for continuous operation at 115, 200, or 277 volt single phase 60 hertz. Where equipment manufacturer offers a choice provide permanent split capacitor motors in lieu of shaded pole motors.
 - 8. Motor leads shall be marked throughout entire length for easy identification and terminate with brass or copper terminal lugs. Motor shall have permanently attached nameplate with electrical characteristics and wiring connection diagram.
- C. ELECTRIC MOTORS (1/2 HP and Larger)
 - 1. Provide equipment requiring electric motors with NEMA Standard motors. Shop drawings, submitted and equipment provided with electric motors shall include motor manufacturer, horsepower, voltage, full load amperes, NEMA design type, insulation class, shaft bearing type, mounting base type, and enclosure type. To greatest extent possible motors for this project shall be by one manufacturer.
 - 2. Motors shall conform to current NEMA Standard MG1. Motor shall operate successfully without derating under the following conditions.
 - 3. 40 degrees C (104°F) maximum ambient temperature, 3,300 Ft. maximum altitude, voltage variations of plus or minus 10% of nameplate rating, frequency variations of plus or minus 5% of nameplate rating, combined voltage and frequency variation of plus or minus 10% total as long as frequency does not exceed plus or minus 5%.
 - 4. Motors shall meet or exceed locked rotor (Starting) and breakdown (maximum) torques

- specified for the NEMA design rating. Lock rotor currents shall not exceed NEMA maximum values for motor NEMA design rating.
5. Motor service factors shall be 1.15 for open dripproof motors and 1.00 for totally enclosed motors.
 6. Unless indicated otherwise, motor insulation may be manufacturers standard for Class A, B or F provided that maximum permissible temperature for insulation is not exceeded when motor is operating at its service factor load in a 40 Degrees C (104°F) ambient.
 7. Motor frame/HP relationship shall conform to current NEMA Standard for “T” frames. Motors shall have antifriction ball or roller bearings sized for average life of at least 100,000 hours under normal v-belt loading conditions. Bearings shall be AFBMA Standard and shield mounted ball bearings of ample capacity for motor rating. Bearing housing shall have provisions for adding new lubricant and draining out old lubricant without major motor disassembly. Bearing housing shall have seals to protect bearing from entrance of foreign matter and to prevent leakage of bearing lubricant.
 8. Conduit box mounting shall rotate to allow conduit entrance from top, bottom or either side. Conduit holes shall conform to NEC Standards.
 9. Motor leads shall have same insulation class as motor windings. Leads shall be marked throughout entire length for easy identification and terminated with brass or copper terminal lugs. Motor shall have permanently attached nameplate with electrical characteristics and wiring connection diagram.
 10. Motor bolts, screws and other external hardware shall be treated with a corrosion resistant plating. Motor enclosure shall be prime painted with corrosion resisting metal primer and finished with a durable machinery enamel paint.
 11. Unless indicted otherwise motors shall be rated for continuous operation at rated voltage, three phase, 60 hertz. Motors shall be T-frame squirrel cage induction. Type NEMA design B with Class B insulation. Motors shall be dripproof totally enclosed or explosion-proof as required by motor environment.

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION 230513

SECTION 230514 – MOTOR CONTROL AND EQUIPMENT DISCONNECTS**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 220010.
- B. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data: For each type of disconnect to be furnished.
- B. Dimensional Drawings: For each respective type and size of disconnect.

PART 2 - PRODUCTS**2.1. MANUFACTURERS**

- A. Equivalents by: G.E., Cutler Hammer, or I.T.E. Siemens, Square D.

2.2. DISCONNECT SWITCHES

- A. Provide heavy-duty horsepower rated Safety Switches rated in accordance with NEMA enclosed Switch Standard KS 1-1969 and L98 Standard.
- B. Enclosure shall be NEMA type and material required by switch location and environment. Enclosure door shall latch with means for padlocking and cover interlock with defeater to prevent opening door when switch is energized or closing switch with door open. Switch shall have an embossed nameplate permanently attached to door front with switch rating, short circuit interrupting capacity and application information.
- C. Line terminals shall be permanently marked and shielded. Contact shall be tin plated, equipped with arch chutes and have movable contacts visible in off position with door open. Wiring terminals shall be pressure type suitable for copper or aluminum wire. Switching mechanism shall be quick-make, quick-break spring driven anti-tease mechanism and shall be integral part of box. All current carrying parts shall be plated.
- D. Fuse holders shall be high pressure suitable for use with dual element fuses or rejection type current limiting fuses where required. Fuse holders shall be completely accessible from front of switch and fuses shall be installed so that the label may be easily read from the front and without removing the fuse.

2.3. MANUAL MOTOR CONTROL (1 HP Maximum)

- A. Provide 300 volt, 60 cycle, AC manually operated motor starting switch meeting current NEMA Standards with proper NEMA enclosure required by starter location and environment.
- B. Starter shall have heavy silver alloy contacts with quick-make, quick-break mechanism manually operated by toggle switch.
- C. Thermal unit shall be melting alloy type, resettable, one-piece interchangeable construction.
- D. Provide starter with all accessories such as pilot light, H.O.A. or two speed switches required to provide control sequence shown on drawings or specified. Selector switches contact shall have same ampere rating as starter switch.

PART 3 EXECUTION**3.1. INSTALLATION**

- A. All fuse holders shall have rejection clips installed.
- B. Mount starter enclosure rigidly and with proper alignment on building structure or steel supports with operating switches not more than 6 feet above finished floor unless otherwise required. Use steel supports fabricated from standard rolled structural steel shapes or framing channel to provide one-inch separation between enclosure and building wall for vertical flow of air.

- C. Furnish and install a nameplate for each starter/switch engraved with the equipment designation which the disconnect serves.
- D. All starters/disconnect switches as specified shall be installed in strict accordance with rules set forth by NEC.
- E. Install starters in locations as shown on plans, installation shall be in strict accordance with NEC, and manufacturer's installation requirements.

END OF SECTION 230514

SECTION 230553 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**PART 1 - GENERAL****1.1. SUMMARY**

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Pipe labels.

1.2. SUBMITTAL

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

PART 2 - PRODUCTS**2.1. EQUIPMENT LABELS**

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware. Black letters on white background.
- B. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- C. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- D. Fasteners: Stainless-steel rivets or self-tapping screws.
- E. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- F. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
- G. Install or permanently fasten labels on each major item of mechanical equipment.
- H. Locate equipment labels where accessible and visible.

2.2. VALVE IDENTIFICATION

- A. Mark all valves with Seton No. 300-BL brass identification tags with system legend, valve number and size stamped on tag. Lettering shall be black 1/2" high. Tags shall be minimum 2" in diameter and attached to valve with Seton No. 16 brass jack chain.
- B. Prepare four copies of typewritten list of valve tags. List shall be typed in upper case and contain tag number, valve size, type, function and location. Frame one list under glass and mount near operating instruction in main equipment rooms.

2.3. PIPING IDENTIFICATION

- A. Colors and wording shall be of standard pipe markers as available from Seaton or equal. Submit for approval list of colors and wording prior to purchase of pipe markers.
- B. Pipe marker nomenclature/colors shall meet applicable ANSI Standard and OSHA requirements. Pipe markers with letters and flow direction arrows
- C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.

5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

END OF SECTION 230553

SECTION 230593 – SYSTEM TESTING & BALANCING**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 230010.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. TESTING AND BALANCING CONTRACTORS

- A. Testing and balancing (TAB) of the building air and hydronic systems will be to be completed near the end of construction. The Mechanical Contractor has responsibility to cooperate with, make adjustments for, and provide any equipment necessary for the TAB contractor to complete the job.

PART 2 - PRODUCTS

- A. Not Used

PART 3 - EXECUTION**3.1. SCOPE OF WORK**

- A. The Contractor shall procure the services of an independent air balance and testing contractor, approved by the A/E, which specializes in the balancing and testing of heating, ventilating and air conditioning systems, to balance, adjust, and test air moving equipment and air distribution and exhaust systems and all water flow circuits. All work by this contractor shall be done under engineer employed by them. All instruments used by this contractor shall be accurately calibrated and maintained in good working order. If requested the tests shall be conducted in the presence of the A/E responsible for the project and/or his representative. The testing and balancing contractor shall be certified by NEBB or AABC and all work shall be performed in accordance with these organizations' published procedure manuals.
- B. The balancing contractor shall prepare a certified report of all tests performed. The report shall be written on standard forms prepared by NEBB or AABC or facsimiles thereof. The balancing contractor shall submit 3 copies of this report to the Mechanical Contractor who shall submit them to the A/E for review and distribution.
- C. Air balance and testing shall not begin until systems have been completed and are in full working order. All heating, ventilation, and air conditioning systems and equipment shall be in full operation during each working day of testing and balancing.

3.2. SYSTEM PREPARATION FOR TESTING AND BALANCING

- A. Prior to requesting testing and balancing contractor to perform their work the installing contractor shall make all necessary inspections and adjustments to insure that systems are completely installed and operating in accordance with the manufacturer's recommendations and the contract documents.
- B. The following checks shall be performed on each system installed under this contract. A report sheet shall be prepared for each system indicating checks made, corrective action taken where required, date, and name of person making inspection. Submit one copy to testing and balancing contractor and two to A/E. Testing and balancing contractor will not begin until checklist has been received and reviewed.

3.3. TEMPERATURE CONTROLS CONTRACTOR COORDINATION

- A. The temperature control contractor shall have a technical representative present with the balancing contractor on the first day of balancing for a minimum of four hours of active balancing and temperature controls coordination.
- B. For the remainder of the balancing the temperature contractor may either have a technical representative present, or may furnish the balancer with the latest DDC software and all required interface devices. This includes instructions and coordination in the use of all interface devices,

including laptop computers. There shall be no charge to the balancing contractor for the use of these interface devices and they shall be returned to the temperature controls contractor at the end of the balancing process.

3.4. AIR HANDLING SYSTEMS:

- A. Clear system of all foreign objects and clean system.
- B. Verify fan rotation.
- C. Check bearing condition and lubrication.
- D. Check fan wheel clearances and fan alignment.
- E. Check motor security to mounting base.
- F. Check alignment of drive.
- G. Check vibration isolator adjustment.
- H. Verify that proper filter media is installed.
- I. Verify that all control dampers are installed and operable without binding or sticking.
- J. Confirm that all fire, smoke and volume dampers are installed and in full open position.
- K. Verify that all air terminal units are installed.
- L. Confirm that all air openings in walls above ceilings have been provided.
- M. Check for and repair all excessive air leaks in duct systems, at equipment connections and at coils.
- N. Air leaks shall not exceed SMACNA parameters for system pressure.
- O. Verify that ductwork is constructed and installed in accordance with contract drawings and/or approved ductwork shop drawings.
- P. Inspect and clean all coils (including evaporator and condenser) and correct fin damage.

3.5. AIR SIDE TESTING AND BALANCING

A. GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

1. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
2. Prepare schematic diagrams of systems' "as-built" duct layouts.
3. For variable-air-volume systems, develop a plan to simulate diversity.
4. The TAB contractor shall cycle each air handling unit through its control sequence of operation to verify proper operation. Any inconsistency with contract documents shall be reported to A/E and temperature control contractor. Temperature control contractor shall take prompt action to correct any control inconsistency as reported by the TAB contractor.
5. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
6. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
7. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
8. Verify that motor starters are equipped with properly sized thermal protection.
9. Check dampers for proper position to achieve desired airflow path.
10. Check for airflow blockages.
11. Check condensate drains for proper connections and functioning.
12. Check for proper sealing of air-handling-unit components.
13. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts."

B. PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

1. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - a. Measure total airflow.

- i. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - b. Measure fan static pressures as follows to determine actual static pressure:
 - i. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - ii. Measure static pressure directly at the fan outlet or through the flexible connection.
 - iii. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - iv. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - c. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - i. Report the cleanliness status of filters and the time static pressures are measured.
 - d. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
 - e. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 - f. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in Division 23 Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 - g. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
2. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 - a. Measure airflow of submain and branch ducts.
 - i. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 - b. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 - c. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
3. Measure air outlets and inlets without making adjustments.
 - a. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
4. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.

- a. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
- b. Adjust patterns of adjustable outlets for proper distribution without drafts.

C. PROCEDURES FOR HEAT-TRANSFER COILS

1. Measure, adjust, and record the following data for each electric heating coil:
 - a. Nameplate data.
 - b. Airflow.
 - c. Entering- and leaving-air temperature at full load.
 - d. Voltage and amperage input of each phase at full load and at each incremental stage.
 - e. Calculated kilowatt at full load.
 - f. Fuse or circuit-breaker rating for overload protection.
2. Measure, adjust, and record the following data for each refrigerant coil:
 - a. Dry-bulb temperature of entering and leaving air.
 - b. Wet-bulb temperature of entering and leaving air.
 - c. Airflow.
 - d. Air pressure drop.
 - e. Refrigerant suction pressure and temperature.

3.6. PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 1. Manufacturer's name, model number, and serial number.
 2. Motor horsepower rating.
 3. Motor rpm.
 4. Efficiency rating.
 5. Nameplate and measured voltage, each phase.
 6. Nameplate and measured amperage, each phase.
 7. Starter thermal-protection-element rating.
- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.7. PROCEDURES FOR CONDENSING UNITS

- A. Verify proper rotation of fans.
- B. Measure entering- and leaving-air temperatures.
- C. Record compressor data.

3.8. PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

- A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
 1. Measure and record the operating speed, airflow, and static pressure of each fan.
 2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
 3. Check the refrigerant charge.
 4. Check the condition of filters.
 5. Check the condition of coils.
 6. Check the operation of the drain pan and condensate-drain trap.
 7. Check bearings and other lubricated parts for proper lubrication.
 8. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.

- B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:
 - 1. New filters are installed.
 - 2. Coils are clean and fins combed.
 - 3. Drain pans are clean.
 - 4. Fans are clean.
 - 5. Bearings and other parts are properly lubricated.
 - 6. Deficiencies noted in the preconstruction report are corrected.
- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
 - 1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
 - 2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
 - 3. If calculations increase or decrease the air flow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
 - 4. Balance each air outlet.

3.9. TOLERANCES

- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10% percent.
 - 2. Air Outlets and Inlets: Plus or minus 10 percent.

3.10. REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: Prepare biweekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.11. FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 - 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
 - 1. Pump curves.
 - 2. Fan curves.
 - 3. Manufacturers' test data.
 - 4. Field test reports prepared by system and equipment installers.
 - 5. Other information relative to equipment performance; do not include Shop Drawings and product data.

- C. General Report Data: In addition to form titles and entries, include the following data:
1. Title page.
 2. Name and address of the TAB contractor.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Water and steam flow rates.
 3. Duct, outlet, and inlet sizes.
 4. Pipe and valve sizes and locations.
 5. Terminal units.
 6. Balancing stations.
 7. Position of balancing devices.

3.12. ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

3.13. AIR AND WATER BALANCE CONSTRUCTION COORDINATION

- A. During installation of the mechanical systems the testing and balancing contractor shall make no less than (3) inspection visits to the project site. Proper placement and installation of all control and balancing devices shall be verified by these inspections. The mechanical contractor shall make all corrections in control and balancing device locations as requested by the TAB contractor. Following each inspection visit the TAB contractor shall report to the A/E all items noted, action

taken, and progress of control device installation. The last inspection and balancing shall be performed in the presence of a professional engineer active in the design of mechanical building systems.

END OF SECTION 230593

SECTION 230719 – PIPING INSULATION**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 230010.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. Section Includes:

- 1. Insulation Materials:
 - a. Flexible elastomeric.
- 2. Insulating cements.
- 3. Adhesives.
- 4. Mastics.
- 5. Sealants.
- 6. Factory-applied jackets.
- 7. Field-applied jackets.
- 8. Tapes.

B. SUBMITTALS

- 1. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).
- 2. Shop Drawings:
 - a. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - b. Detail attachment and covering of heat tracing inside insulation.
 - c. Detail insulation application at pipe expansion joints for each type of insulation.
 - d. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 - e. Detail removable insulation at piping specialties, equipment connections, and access panels.
 - f. Detail application of field-applied jackets.
 - g. Detail application at linkages of control devices.
 - h. Detail field application for each equipment type.
- 3. Qualification Data: For qualified Installer.
- 4. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. QUALITY ASSURANCE

- 1. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- 2. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

- a. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - b. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.
3. Products shall not contain formaldehyde, asbestos, lead, mercury, mercury compounds, or polybrominated diphenyl ether fire retardants.

1.3. DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.4. COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application and equipment Installer for equipment insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.5. SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 PRODUCTS

2.1. INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

2.2. PIPING AND EQUIPMENT INSULATION

- A. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Aeroflex USA Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

2.3. INSULATING CEMENTS

- A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

2.4. ADHESIVES

- A. Military Specification referenced in this article is the only standard available when this Section was

updated. MIL-A-3316C was last updated in October 1987.

- B. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
 - 1. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 1. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. PVC Jacket Adhesive: Compatible with PVC jacket.
 - 1. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5. MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
 - 1. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
 - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 3. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 - 4. Color: White.
- C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
 - 1. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.
 - 2. Service Temperature Range: Minus 20 to plus 200 deg F.
 - 3. Solids Content: 63 percent by volume and 73 percent by weight.
 - 4. Color: White.

2.6. SEALANTS

- A. Joint Sealants:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 2. Permanently flexible, elastomeric sealant.
 - 3. Service Temperature Range: Minus 100 to plus 300 deg F.
 - 4. Color: White or gray.
 - 5. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. FSK and Metal Jacket Flashing Sealants:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 2. Fire- and water-resistant, flexible, elastomeric sealant.
 - 3. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 4. Color: Aluminum.
 - 5. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.

2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: White.
5. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7. FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 3. ASJ+ SSL+: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing, interleaving with an outer polymer film leaving no paper exposed, and pressure-sensitive, acrylic-based adhesive covered by removable protective strip; complying with ASTM C 1136, Type I, II, III, IV, VII, VIII, and X
 4. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
 5. PVDC Jacket for Indoor Applications: 4-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perms when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.

2.8. FIELD-APPLIED FABRIC-REINFORCING MESH

- A. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. inch, in a Leno weave, for equipment and pipe.

2.9. FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. Although other thicknesses for PVC jackets are available, a flame-spread index of 25 and a smoke-developed index of 50 apply only to thicknesses of 30 mils (0.8 mm) and less.
- C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 1. See Editing Instruction No. 1 in the Evaluations for cautions about naming manufacturers and products. See Division 01 Section "Product Requirements."
 2. Adhesive: As recommended by jacket material manufacturer.
 3. Color: White
 4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
 5. Factory-fabricated tank heads and tank side panels.

2.10. TAPES

- A. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.
 1. Width: 2 inches.
 2. Thickness: 6 mils.
 3. Adhesion: 64 ounces force/inch in width.
 4. Elongation: 500 percent.

5. Tensile Strength: 18 lbf/inch in width.

2.11. SECUREMENTS

- A. Aluminum Bands: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing or closed seal.
- B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

2.12. INSULATION SCHEDULE

INSULATION SERVICE		SIZE	TYPE	THICKN ESS	JACKET
Condensate Drain		All Sizes	FE	1/2"	ASJ-SSL
Refrigerant*		All Sizes	FE	1"	
MF - Mineral-Fiber	CG - Cellular Glass	FE - Flexible Elastomeric			

*Provide a PVC jacket and fitting covers over all pipe insulation located on the exterior of the building.

PART 3 – EXECUTION

3.1. EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
1. Verify that systems and equipment to be insulated have been tested and are free of defects.
 2. Verify that surfaces to be insulated are clean and dry.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3. GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers,

supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at [2 inches] [4 inches] o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above ambient services, do not install insulation to the following:
1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Manholes.
 5. Handholes.
 6. Cleanouts.
- Q. Undamaged insulation systems on cold surface piping and equipment shall perform their intended functions as vapor barriers and thermal insulation without premature deterioration of insulation or vapor barrier. Contractor shall take every reasonable precaution to provide insulation systems with continuous unbroken vapor barriers.

3.4. PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Penetration Firestopping and fire-resistive joint sealers.
- C. Insulation Installation at Floor Penetrations:
1. Pipe: Install insulation continuously through floor penetrations.
 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Penetration Firestopping."

3.5. GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 2. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 3. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6. FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
1. Install pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation section same as overall width of flange and bolts, plus twice the

- thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Pipe Fittings and Elbows:
1. Install mitered sections of pipe insulation.
 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed valve covers manufactured of same material as pipe insulation when available.
 2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 3. Install insulation to flanges as specified for flange insulation application.
 4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7. FIELD-APPLIED JACKET INSTALLATION

- A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.
1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.8. FINISHES

- A. Equipment and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.
1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.

3.9. FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
1. Inspect field-insulated equipment, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.

2. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.
 - E. Insulation failing to meet workmanship and appearance standards shall be replaced with an acceptable installation before final acceptance of project will be given. Insulation failing to meet performance requirements of this specification for a period of one year after date of final acceptance or through one heating season and one cooling season, whichever is longer shall be replaced with an acceptable installation. All costs to correct insulation deficiencies and costs to repair damages to other work shall be at Mechanical Contractors expense at no cost to owner.

END OF SECTION 230719

SECTION 232000 – HVAC PIPING**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 230010.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data: For each type of product to be used.

PART 2 - PRODUCTS**2.1. PIPING AND FITTING MATERIALS**

- A. Piping used throughout project shall conform to the following specifications. Piping shall be plainly marked with manufacturers name and weight. See piping material schedule on the drawings for materials to be used for each piping system.

1. Copper Tube:

a. Tube/Pipe:

- i. Provide hard temper copper water tube conforming to requirements of current ASTM Specification B-88. Tubing shall be Type K, L, or M as listed in schedule. Tubing joints shall be soldered, brazed or Viega Pro-Press style fittings. See schedule for joining method to be used.
- ii. Pipe by Anaconda, Cerro, Chase, Mueller or Revere Copper.

b. Wrought Copper Fittings:

- i. Provide wrought solder joint copper tube fitting conforming to ANSI Standard B16.22
- ii. Fittings by Anaconda, Chase, Nibco

c. Grooved Joint Fittings: ASME B16.22 wrought copper or cast bronze to ASME B16.18. Manufactured to copper-tube dimensions. (Flaring of tube or fitting ends to accommodate alternate sized couplings is not permitted.) Victaulic Copper Connection.

d. Provide Victaulic Installation-Ready Style 607H couplings with grade 'EHP' gasket. Copper-tube dimensions with offsetting, angle-pattern bolt pads.

e. Press fitting: Provide fittings for press style joints by Viega, Merit or Nibco.

2. Copper Tube Type ACR:

- a. Provide hard temper nitrogenized copper refrigerant tube conforming to requirements of current ASTM B-88. Tubes shall be Type L or K as listed in schedule.
- b. Tubing joints shall be brazed.
- c. Pipe by Anaconda, Cerro, or Mueller.

PART 3 - EXECUTION**3.1. PIPING INSTALLATION**

- A. Piping systems materials and installation shall conform to the following standards and codes.

1. System: Heating and Air Conditioning Piping

- a. Code: ANSI Standard B31.1.0 "Power Piping"

- B. No piping containing water shall be located in areas subject to freezing temperatures, including: unheated attics, unheated plenums, chases wall spaces or cavities within exterior walls, under slabs, or in concrete.
- C. Pipe sizes indicated on plans and as specified refer to nominal size in inches, unless otherwise indicated. Pipes are sized to nearest ½". In no case shall piping smaller than size specified be used.
- D. Contractor shall provide and be responsible for proper location of pipe sleeves, hangers, supports, and inserts. Install hangers, supports, inserts, etc., as recommended by manufacturer and as specified and detailed on drawings.
- E. Verify construction types and provide proper hangers, inserts and supports for construction used. Install inserts, hangers and supports in accordance with manufacturers load ratings and provide for thermal expansion of piping without exceeding allowable stress on piping or supports. Provide solid type hangers and supports where pipe travel exceeds manufacturer's recommendations for fixed hanger and supports.
- F. Install piping parallel with building lines and parallel with other piping to obtain a neat and orderly appearance of piping system. Secure piping with approved anchors and provide guides where required to insure proper direction of piping expansion. Piping shall be installed so that allowable stress for piping, valves and fittings used are not exceeded during normal operation or testing of piping system.
- G. Fittings pressures and temperature ratings shall be equal to or exceed maximum operating temperature and working pressure of piping system. No mitered or field fabricated pipe fittings will be permitted.
- H. All pipe threads shall meet ANSI Standard B2.1 for taper pipe threads. Lubricate pipe threads with Teflon thread sealant and lubricating compound applied full strength. Powdered or made-up compound will not be permitted. Pipe thread compound shall be applied only to male pipe threads.
- I. Brazed socket type joints shall be made with suitable brazing alloys. Minimum socket depth shall be sufficient for intended service. Brazing alloy shall be end fed into socket, and shall fill completely annular clearance between socket and pipe or tube. Brazed joints depending solely upon a fillet rather than a socket type joint will not be acceptable.
- J. Soft soldered socket type joints shall be made with sill-floss or 95-5 tin-antimony solder as required by temperature and pressure rating of piping system. Soldered socket-type joints shall be limited to systems containing non-flammable and non-toxic fluids. Soldered socket-type joints shall not be used on piping systems subject to shock vibration. Soldered joints depending solely upon a fillet rather than a socket-type joint will not be acceptable.
- K. Make changes in piping size and direction with approved factory made fittings. Provide fittings suitable for at least 125 PSI working pressure or of pressure rating required for maximum working pressure of system whichever is greater.

3.2. PIPING SUPPORTS, ANCHORS, SLEEVES AND SEALS

- A. Furnish proper type and size pipe sleeves to General Contractor for installation in concrete or masonry walls or floors. Sleeves are not required for supply and waste piping through wall supporting plumbing fixtures or for cast iron soil pipe passing through concrete slab or grade except where penetrating a membrane waterproof floor.
- B. Mechanical Contractor shall supervise installation of sleeves to insure proper location and installation.
- C. Each sleeve shall be continuous through wall floor or roof and shall be cut flush on each side except where indicated otherwise. Sleeves shall not be installed in structural member except where indicated or approved.
- D. Sleeves passing through above grade floors subject to flooding such as toilet rooms, bathrooms, equipment rooms and kitchens shall be cast iron with integral flanges and shall extend 1 inch above finished floor. Size sleeves for and seal space between pipe sleeve with Thunderline Link-Seal.
- E. Provide steel pipe sleeves in bearing walls and masonry walls. Opening in non-bearing walls, floors and ceilings may be 20 gauge galvanized pipe sleeves or openings cut with concrete core

drill.

- F. Pipe insulation shall run continuous through pipe sleeves with ¼” minimum clearance between insulation and pipe sleeve. Provide metal jackets over insulated pipes passing through fire walls, floors and smoke partitions. Jacket shall be 0.018 stainless steel extending 12 inches on either side of barrier and secured to insulation with 3/8” wide band. Seal annular space between jacket and pipe sleeves with Thunderline High Temperature Link Seal.
- G. Pipe wall penetrations exposed to view shall have tight fitting escutcheons or flanges to cover all voids around openings.
- H. All below grade and exterior wall penetrations shall be installed in a pipe sleeve and sealed between the pipe and pipe sleeve with Thunderline High Temperature Link Seal or similar compressed link type system.
- I. Provide sleeves through all fire-rated walls and fill voids surrounding sleeves and interior to sleeves around cables with Nelson “Flameseal” fire stop putty with U.L. listed 3 hour rating installed as per manufacturers recommendations.
- J. Equivalent by Dow, Chemelex, 3M.

3.3. PIPE HANGERS AND SUPPORTS

- A. Provide and be responsible for locations of piping hangers, supports and inserts, etc., required for installation of piping under this contract. Design of hangers and supports shall conform to current issue of Manufacturers Standardization Society Specification (MSS) SP-58.
- B. Pipe hangers shall be capable of supporting piping in all conditions of operation. They shall allow free expansion and contraction of piping, and prevent excessive stress resulting from transferred weight being induced into pipe or connected equipment. Support horizontal or vertical pipes at locations of least vertical movement.
- C. Where horizontal piping movements are such that hanger rod angularity from vertical is greater than 4 degrees from cold to hot position of pipe, offset hanger, pipe, and structural attachments to that rod is vertical in hot position.
- D. Hangers shall not become disengaged by movements of supported pipe.
- E. Provide sufficient hangers to adequately support piping system at specified spacing, at changes in piping direction and at concentrated loads. Hangers shall provide for vertical adjustment to maintain pitch required for proper drainage, and for longitudinal travel due to expansion and contraction of piping. Fasten hangers to building structural members wherever practicable.
- F. Unless indicated otherwise on drawings support horizontal steel piping as follows:

PIPE SIZE	ROD DIAMETER	MAXIMUM SPACING
Up to 1-1/4”	3/8”	8 Ft.
1-1/2” to 2”	3/8”	10 Ft.
2-1/2” to 3-1/2”	½”	12 Ft.
4” and 5”	5/8”	15 Ft.

- G. Unless indicated otherwise on drawings support horizontal copper tubing as follows:

NOM. TUBING SIZE	ROD DIAMETER	MAXIMUM SPACING
Up to 1”	3/8”	6 Ft.
1-1/4” to 1-1/2”	3/8”	8 Ft.
2”	3/8”	9 Ft.
2-1/2”	½”	9 Ft.

3" and 4"	½"	10 Ft.
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- H. Support horizontal cast iron soil pipe with two hangers for each section located close to each hub.
- I. Support vertical cast iron soil pipe at every floor, steel and copper tubing at every other floor except where indicated otherwise on drawings.
- J. Provide continuous threaded hanger rods wherever possible. No chain, wire, or perforated straps shall be used.
- K. Hanger rods shall be subject to tensile loading only, where lateral or axial pipe movement occurs provide suitable linkage to permit swing. Provide pipe support channels with galvanized finish for concealed locations and painted finish for exposed locations. Submit design for multiple pipe supports indicating pipe sizes, service and support detail to Architect-Engineer for review prior to fabrication.
- L. Provide Grinnell pipe hangers for vertical pipe risers as follows:

PIPE MATERIAL	PIPE SIZE	HANGER FIG. NO.
Copper	½" thru 4"	CT-121
Steel	¾" thru 20"	261

- M. Provide Grinnell Fig. 194, 195 or 199 steel wall brackets for piping suspended or supported from walls. Brackets shall be prime coated carbon steel.
- N. Mount hangers for insulated piping on outside of pipe insulation sized to allow for full thickness of pipe insulation.
- O. Provide Grinnell Fig. 167 insulation protection shields sized so that line compressive load does not exceed one-third of insulation compressive strength. Shield shall be galvanized steel and support lower 180 degrees of pipe insulation on copper tubing. Provide wood block at each pipe hanger in thickness of insulation. Insulation vapor barrier jacket shall overlap wood block to maintain vapor barrier.
- P. Structural attachments for pipe hangers shall be as follows:
- Q. Concrete Structure: Provide Grinnell Fig. No. 285 cast in concrete insert for loads up to 400 lbs. and Grinnell Fig. 281 wedge cast in type concrete insert for loads up to 1200 lbs.
- R. Provide Grinnell pipe hangers for horizontal single pipe runs as follows:

PIPE MATERIALS	PIPE SIZE	HANGER FIG. NO.
Copper	½" thru 4"	CT-65
Steel	3/8" thru 4"	65
Steel	5" thru 30"	260

- S. Provide Fee and Mason Fig. 600 channel trapeze pipe hangers for horizontal multiple pipe runs with pipe clamps or pipe rollers as follows:

PIPE MATERIALS	PIPE SIZE	CLAMP NO.	ROLLER NO.
Copper	3/8" thru 4"	8600 CP*	8010 CP*
Steel	3/8" thru 6"	8500	8010

*Copper Plated

- T. Pipe supports for horizontal piping mounted on pipe racks or stanchions shall be Advanced Thermal Systems low friction graphite slide supports or equivalent by Elcen or Grinnell. Where racks and supports are not detailed on drawings submit detailed support drawings to Architect-Engineer for review prior to fabrication.
- U. Provide Fee and Mason Fig. 404 vibration control hangers at locations where piping vibrations would be transmitted to building structure by conventional hangers. Apply hangers within their

- load supporting range.
- V. Provide Elcen Fig. 50 pipe saddle with adjuster to support piping from floor. Provide complete with pedestal type floor stand.
 - W. Provide necessary structural steel and attachment accessories for installations of pipe hangers and supports. Where heavy piping loads are to be attached to building structure verify structural loading with Architect-Engineer prior to installations.
 - X. Equivalent hangers and supports by Auto-Grip, Basic Engineer, Bee Line, Elcen, Fee & Mason, Fluorocarbon Company, Unistrut or Super Strut Inc.
 - A. Provide premanufactured pipe support for piping located on flat roofs, unless otherwise indicated on drawings. Support will be of modular designs with roller bearings and guide saddles for straight piping runs longer than 50' and Unistrut type clamp/support type for other shorter runs. Maximum pipe support spacing shall be 10' for steel piping. Copper piping and refrigerant piping shall be supported at shorter distances. Piping near equipment connections shall be supported within 3' of units. System supports shall be compatible with roofing materials and shall be provided with plates, pads, etc to spread weight and wear on roof surface. Provide pipe supports from Miro Industries, B-Line, or approved equivalent.

END OF SECTION 232000

SECTION 238116 – MINI-SPLIT SYSTEMS**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 230010.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and scheduled.
- B. Wiring Diagrams: For units with fan coils fed from/through the outdoor units.
- C. Field quality-control test reports.
- D. Operation and maintenance data.

PART 2 PRODUCTS**2.1. GENERAL****A. MANUFACTURERS:**

1. Approved equivalent manufacturers: Lennox, Daikin, Mitsubishi, LG

B. QUALITY ASSURANCE

1. The units shall be listed by Electrical Laboratories (ETL) and bear the cETL label.
2. All wiring shall be in accordance with the National Electric Code (NEC).
3. The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.
4. The outdoor unit will be factory charged with R-410A.

C. DELIVERY, STORAGE AND HANDLING

1. Unit shall be stored and handled according to the manufacturer's recommendations.

D. WARRANTY

1. The units shall have a manufacturer's warranty for a period of one (1) year from date of installation. The units shall have a limited labor warranty for a period of one (1) year from date of installation. The compressors shall have a warranty of six (6) years from date of installation. During the stated period, should any part fail due to defects in material and workmanship, it shall be repaired or replaced at factory by trained service professional.

2.2. UNITS**A. GENERAL****1. REQUIREMENTS**

- a. Units shall be operable with refrigerant R-410A, equipped with an electronic expansion valve, for installation within a conditioned space. The unit shall be equipped with a programmed drying mechanism that dehumidifies while inhibiting changes in room temperature when used with remote control. A mold-resistant, resin net air filter shall be included as standard equipment.
- b. Indoor units shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.

- c. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
 - d. Both refrigerant lines shall be insulated from the outdoor unit.
 - e. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump provides up to 21” of lift.
 - f. The indoor units shall be equipped with a return air thermistor.
 - g. The voltage range will be 253 volts maximum and 187 volts minimum.
2. Fan: The fan shall be statically and dynamically balanced impeller with high and low fan speeds available. The airflow rate shall be available in high and low settings. The fan motor shall be thermally protected.
3. Coil:
- a. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
 - b. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
 - c. The coil shall be a 2 or 3-row cross fin copper evaporator coil with design completely factory tested.
 - d. The refrigerant connections shall be flare connections.
 - e. A condensate pan shall be located under the coil.
 - f. A condensate pump shall be located below the coil in the condensate pan with a built in safety alarm.
 - g. A thermistor will be located on the liquid and gas line.
4. Filter: The return air shall be filtered by means of a washable long-life filter with mildew proof resin.
5. Electrical: A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
6. Control: The unit shall have controls provided by manufacturer to perform input functions necessary to operate the system. The unit shall be compatible with interfacing with connection to LonWorks networks or interfacing with connection to BMS system. Consult with manufacturer prior to applying controls and provide all necessary interface materials and labor.

B. WALL MOUNTED UNIT

- 1. General: Indoor unit shall be a wall mounted fan coil unit for installation onto a wall within a conditioned space. This compact design with finished white casing shall be available from 7,500 Btu/h to 24,000 Btu/h capacities.
- 2. Unit Cabinet: The cabinet shall be affixed to a factory supplied wall mounting template and located in the conditioned space. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
- 3. Fan: The fan shall be a direct-drive cross-flow fan.
- 4. Accessories: Remote “in-room” sensor kit,. condensate pump.

2.3. OUTDOOR UNIT

A. General

- 1. The outdoor unit is designed specifically for use with series components.
- 2. The outdoor unit shall be factory assembled and pre-wired with all necessary electronic and refrigerant controls. The refrigeration circuit of the condensing unit shall consist of scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports and refrigerant regulator.

- a. High/low pressure gas line, liquid and suction lines must be individually insulated between the outdoor and indoor units.
 3. The system will automatically restart operation after a power failure and will not cause any settings to be lost, thus eliminating the need for reprogramming.
 4. The unit shall incorporate an auto-charging feature and a refrigerant charge check function.
 5. Oil recovery cycle shall be automatic occurring 2 hours after start of operation and then every 8 hours of operation.
 6. The outdoor unit shall be capable of heating operation at 0°F dry bulb ambient temperature without additional low ambient controls.
 7. The system shall continue to provide heat to the indoor units in heating operation while in the defrost mode.
- B. Unit Cabinet:
1. The outdoor unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed mild steel panels coated with a baked enamel finish.
 2. The outdoor unit shall have factory installed hail guards or field installed Permatron model # Hailguard 54 black polypropylene netting.
- C. Fan: The condensing unit shall consist of one or more propeller type, direct-drive 350 and 750 W fan motors that have multiple speed operation via a DC (digitally commutating) inverter. The fan motor shall have inherent protection and permanently lubricated bearings and be mounted.
- D. Condenser Coil:
1. The condenser coil shall be manufactured from copper tubes expanded into aluminum fins to form a mechanical bond.
 2. The heat exchanger coil shall be of a waffle louver fin and rifled bore tube design to ensure high efficiency performance.
 3. The heat exchanger on the condensing units shall be manufactured from Hi-X seamless copper tube with N-shape internal grooves mechanically bonded on to aluminum fins to an e-Pass Design.
 4. The fins are to be covered with an anti-corrosion acrylic resin and hydrophilic film type E1.
 5. The pipe plates shall be treated with powdered polyester resin for corrosion prevention. The thickness of the coating must be between 2.0 to 3.0 microns.
- E. Compressor:
1. The inverter driven compressor in each condensing unit shall be of highly efficient reluctance DC (digitally commutating), hermetically sealed scroll “G-type” with a maximum speed of 7,980 rpm.
 2. Neodymium magnets shall be adopted in the rotor construction to yield a higher torque and efficiency in the compressor instead of the normal ferrite magnet type. At complete stop of the compressor, the neodymium magnets will position the rotor into the optimum position for a low torque start.
 3. The capacity control range shall be as low as 6% to 100%.
 4. Each non-inverter compressor shall also be of the hermetically sealed scroll type.
 5. Each compressor shall be equipped with a crankcase heater, high pressure safety switch, and internal thermal overload protector.
 6. Oil separators shall be standard with the equipment together with an intelligent oil management system.
 7. The compressor shall be spring mounted to avoid the transmission of vibration.
 8. In the case of multiple condenser modules, conjoined operation hours of the compressors shall be balanced by means of the Duty Cycling Function, ensuring sequential starting of each module at each start/stop cycle, completion of oil return, completion of defrost or every 8 hours.

F. Electrical:

1. The control voltage between the indoor and outdoor unit shall be 16VDC non-shielded, stranded 2 conductor cable.

PART 3 EXECUTION

3.1. COORDINATION

- A. Provide approved submittals to other parties or verify G/C has provided record submittals for use in coordination of connections between other trades well in advance to coordinate other submittals and construction rough-ins.

3.2. UNIT INSTALLATION

- A. Suspended Units: Suspend from structure using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.
- B. Controls: Install thermostats and humidistats at mounting height of 60 inches above floor.
- C. Identify according to Division 23 Section Mechanical Identification.
- D. Manufacturer to final size all refrigerant lines. Provide all valves, fittings and any other components as required for refrigerant line lengths indicated by drawings. Provide all refrigerant and oil required for each refrigerant circuit.

3.3. AIR HANDLER CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect condensate drain pans. Extend to nearest equipment or floor drain. Construct deep trap at connection to drain pan and install cleanouts at changes in direction.
- C. Connect ducts according to Division 23 Section Ductwork.
- D. Install piping adjacent to machine to allow service and maintenance.
- E. Ground equipment according to Division 26 Section "Grounding"
- F. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4. AIR HANDLER ADJUSTING

- A. Adjust initial temperature and humidity set points.
- B. Set controls, and other adjustments for optimum heating performance and efficiency. Adjust heat-distribution features, including shutters, dampers, and relays, to provide optimum heating performance and system efficiency.

3.5. SYSTEM AND EQUIPMENT IDENTIFICATION

- A. Provide engraved equipment labels for all pieces of equipment including indoor units and outdoor units.

3.6. FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including connections. Report results in writing.
- B. Perform the following field quality-control tests and inspections and prepare test reports:
 1. After installing units and after electrical circuitry has been energized, test units for compliance with requirements.
 2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and

equipment.

5. Remove malfunctioning units, replace with new units, and retest as specified above.

3.7. STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
- B. Complete installation and startup checks according to manufacturer's written instructions and do the following:
 1. Inspect for visible damage to unit casing.
 2. Inspect for visible damage to compressor, air-cooled outside coil, and fans.
 3. Inspect internal insulation.
 4. Verify that labels are clearly visible.
 5. Verify that clearances have been provided for servicing.
 6. Verify that controls are connected and operable.
 7. Verify that filters are installed.
 8. Clean outside coil and inspect for construction debris.
 9. Adjust vibration isolators.
 10. Lubricate bearings on fan.
 11. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
 12. Start unit according to manufacturer's written instructions.
 13. Complete startup sheets and attach copy with Contractor's startup report.
 14. Inspect and record performance of interlocks and protective devices; verify sequences.
 15. Operate unit for an initial period as recommended or required by manufacturer.
 16. Calibrate thermostats/sensors.
 17. Adjust and inspect high-temperature limits.
- C. Start refrigeration system and measure and record the following:
 1. Coil leaving-air, dry- and wet-bulb temperatures.
 2. Coil entering-air, dry- and wet-bulb temperatures.
 3. Outside-air, dry-bulb temperature.
 4. Outside-air-coil, discharge-air, dry-bulb temperature.
- D. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
- E. Measure and record the following minimum and maximum airflows.
 1. Supply-air volume.
 2. Return-air volume.
 3. Outside-air intake volume.
- F. Simulate maximum cooling demand and inspect the following:
 1. Compressor refrigerant suction and hot-gas pressures.
- G. After startup and performance testing, change filters, vacuum cooling and outside coils, lubricate bearings.
- H. Provide one spare set of clean filters and deliver to owner.

3.8. COMMISSIONING

- A. Verify that units are installed and connected according to the Contract Documents.
- B. Complete installation and startup checks according to manufacturer's written instructions and do the following:
- C. Inspect for physical damage to unit casing.
- D. Verify that access doors move freely and are weathertight.
- E. Clean units and inspect for construction debris.
- F. Check that all bolts and screws are tight.
- G. Adjust vibration isolation and flexible connections.

- H. Verify that controls are connected and operational.
- I. Lubricate bearings on fans.
- J. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
- K. Adjust fan belts to proper alignment and tension.
- L. Start unit according to manufacturer's written instructions.
- M. Complete manufacturer's starting checklist.
- N. Measure and record airflow over coils.
- O. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.
- P. After startup and performance test lubricate bearings.

3.9. UNIT DEMONSTRATION

- A. Startup Services: Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:
- B. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
- C. Schedule training with Owner, through Architect, with at least 7 days' advance notice.

3.10. AIR HANDLER CLEANING

- A. After completing installation, clean units internally according to manufacturer's written instructions.
- B. Install new filters in each unit within 14 days after Substantial Completion.

3.11. COORDINATION

- A. Provide approved submittals to other parties or verify G/C has provided record submittals for use in coordination of connections between other trades well in advance to coordinate other submittals and construction rough-ins.
- B. Review other trades submittals for coordination of connections and related installation clearances, appurtenances and related equipment.
- C. Conduct coordination meeting with all related trades prior to installation of equipment. Bring all apparent conflicts to the attention of the Architect/Engineer.

3.12. CONDENSING UNIT INSTALLATION

- A. Install condensing units according to manufacturer's written instructions.
- B. Install units level and plumb, firmly anchored in locations indicated; maintain manufacturer's recommended clearances.
- C. Install ground-mounted units on 4-inch-thick, reinforced concrete base, 4 inches larger than condensing unit on each side. Coordinate installation of anchoring devices.
- D. Install roof-mounted units on manufactured equipment supports. Anchor unit to supports with removable fasteners.
- E. Install hailguards on outdoor units. Permatron model # Hailguard 54 black polypropylene netting.

3.13. CONDENSING UNIT CONNECTIONS

- A. Connect precharged refrigerant tubing to unit's quick-connect fittings. Install tubing so it does not interfere with access to unit. Install furnished accessories.
- B. Connect refrigerant piping to air-cooled condensing units; maintain required access to unit. Install furnished field-mounted accessories.
- C. Ground equipment.
- D. All exterior control wiring shall be installed in conduit.
- E. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.14. CONDENSING UNIT FIELD QUALITY CONTROL

- A. Leak Test: After installation, charge systems with refrigerant and oil and test for leaks. Repair leaks and replace lost refrigerant and oil.
- B. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation, product capability, and compliance with requirements.
- C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Remove and replace malfunctioning units with new units and retest.

3.15. CONDENSING UNIT CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Clean units to remove dirt and construction debris and repair damaged finishes.

END OF SECTION 238116

SECTION 260010 – ELECTRICAL PROVISIONS**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. All contract documents including drawings, alternates, addenda and modifications and general provisions of the Contract, including General and Supplementary Conditions and all other Division Specification Sections, apply to work of this section. All preceding and following sections of this specification division are applicable to the Electrical Contractor, all sub-contractors, and all material suppliers.

1.2. SCOPE OF WORK

- A. This DIVISION requires the furnishing and installing of complete functioning Electrical systems, and each element thereof, as specified or indicated on Drawings or reasonably inferred, including every article, device or accessory reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the Work include materials, labor, supervision, supplies, equipment, transportation, and utilities.
- B. In case of an inconsistency between the Drawings and Specifications or within either document, the better quality or the greater quantity of work shall be provided in accordance with the Architect or Engineer's interpretation.
- C. Refer to Architectural, Structural and Mechanical Drawings and all other contract documents and to relevant equipment drawings and shop drawings to determine the extent of clear spaces and make all offsets required to clear equipment, beams and other structural members to facilitate concealing conduit in the manner anticipated in the design.

1.3. SPECIFICATION FORM AND DEFINITIONS

- A. The Engineer indicated in these specifications is Pearson Kent McKinley Raaf Engineers LLC. 13300 W 98th Street, Lenexa, KS 66215, PHONE 913-492-2400, EMAIL admin@pkmreng.com.
- B. Contractor, wherever used in these specifications, shall mean the Company that enters into contract with the Owner to perform this section of work.
- C. When a word, such as "proper", "satisfactory", "equivalent", and "as directed", is used, it requires the Architect-Engineer's review.
- D. "PROVIDE" means to supply, purchase, transport, place, erect, connect, test, and turn over to Owner, complete and ready for regular operation, the particular Work referred to.
- E. "INSTALL" means to join, unite, fasten, link, attach, set up, or otherwise connect together before testing and turning over to Owner, complete and ready for regular operation, the particular Work referred to.
- F. "FURNISH" means to supply all materials, labor, equipment, testing apparatus, controls, tests, accessories, and all other items customarily required for the proper and complete application for the particular Work referred to.
- G. "WIRING" means the inclusion of all raceways, fittings, conductors, connectors, tape, junction and outlet boxes, connections, splices, and all other items necessary and/or required in connection with such Work.
- H. "CONDUIT" means the inclusion of all fittings, hangers, supports, sleeves, etc.
- I. "AS DIRECTED" means as directed by the Architect/Engineer, or his representative.
- J. "CONCEALED" means embedded in masonry or other construction, installed behind wall furring or within double partitions, or installed above hung ceilings.

1.4. QUALIFICATIONS

- A. The contractors responsible for work under this section shall have completed a job of similar scope and magnitude within the last 3 years. The contractors shall employ an experienced, competent and adequate work force licensed in their specific trade and properly supervised at all times. Unlicensed workers and general laborers shall be adequately supervised to insure competent and quality work

and workmanship required by this contract and all other regulations, codes and practices. At all times the contractors shall comply with all applicable local, state and federal guidelines, practices and regulations. Contractor may be required to submit a statement of qualifications upon request before any final approval and selection. Failure to be able to comply with these requirements is suitable reason for rejection of a bid.

1.5. LOCAL CONDITIONS

- A. The contractor shall visit the site and determine the existing local conditions affecting the work required. Failure to determine site conditions or nature of existing or new construction will not be considered a basis for granting additional compensation.

1.6. CONTRACT CHANGES

- A. Changes or deviations from the contract documents; including those for extra or additional work must be submitted in writing for review of Architect-Engineer. No verbal change orders will be recognized.

1.7. LOCATIONS AND INTERFERENCES

- A. Locations of equipment, conduit and other electrical work are indicated diagrammatically by electrical drawings. Layout work from dimensions on Architectural and Structural Drawings. Verify equipment size from manufacturers shop drawings.
 - 1. Contractor shall be responsible for confirming adequate working space (depth, width, and height) is maintained about all equipment as required per applicable sections of the NEC, including all entrance and egress requirements.
 - 2. Coordinate with other trades to verify adequate Dedicated Equipment Space is maintained about all equipment as required per NEC.
- B. Study and become familiar with contract drawings of other trades and in particular general construction drawings and details in order to obtain necessary information for figuring installation. Cooperate with other workmen and install work in such a way to avoid interference with their Work. Minor deviations, not affecting design characteristics, performance or space limitation may be permitted if reviewed prior to installation by Architect-Engineer.
- C. Any conduit, apparatus, appliance or other electrical item interfering with proper placement of other work as indicated on drawings, specified, or required, shall be removed, relocated and reconnected without extra cost. Damage to other Work caused by this contractor, subcontractor, workers or any cause whatsoever, shall be restored as specified for new work.
- D. Do not scale electrical drawings for dimensions. Accurately layout work from dimensions indicated on Architectural drawings unless they are found to be in error.

1.8. PERFORMANCE

- A. Final acceptance of work shall be subject to the condition that all systems, equipment, apparatus and appliances operate satisfactorily as designed and intended. Work shall include required adjustment of systems and control equipment installed under this specification division.
- B. The Contractor warrants to the Owner and Architect-Engineer the quality of materials, equipment, workmanship and operation of equipment provided under this specification division for a period of one year from and after completion of building and acceptance of mechanical systems by Owner.

1.9. WARRANTY

- A. The Contractor warrants to the Owner and Architect-Engineer that upon notice from them within a one year warranty period following date of acceptance, that all defects that have appeared in materials and/or workmanship, will be promptly corrected to original condition required by contract documents at Contractor's expense.
- B. The above warranty shall not supersede any separately stated warranty or other requirements required by law or by these specifications.

1.10. ALTERNATES

- A. Refer to General Requirements for descriptions of any alternates that may be included.

1.11. MATERIALS, EQUIPMENT AND SUBSTITUTIONS

- A. The intent of these specifications is to allow ample opportunity for the Contractor to use their ingenuity and abilities to perform the work to their and the Owner's best advantage, and to permit maximum competition in bidding on standards of materials and equipment required.
- B. Material and equipment installed under this contract shall be first class quality, new, unused and without damage.
- C. In general, these specifications identify required materials and equipment by naming one or more manufacturer's brand, model, catalog number and/or other identification. The first named manufacturer or product is used as the basis for design; other manufacturers named must furnish products consistent with specifications of first named product as determined by Engineer. Base bid proposal shall be based only on materials and equipment by manufacturers named, except as hereinafter provided.
- D. Where materials or equipment are described but not named, provide required items of first quality, adequate in every respect for intended use. Such items shall be submitted to Architect-Engineer for review prior to procurement.
- E. Materials and equipment proposed for substitutions shall be equal to or superior to that specified in construction, efficiency, utility, aesthetic design, and color as determined by Architect-Engineer whose decision shall be final and without further recourse. Physical size of substitute brand shall be no larger than space provided including allowances for access for installation and maintenance. Requests must be accompanied by two copies of complete descriptive and technical data including manufacturer's name, model and catalog number, photographs or cuts, physical dimensions, operating characteristics and any other information needed for comparison.
- F. If the Contractor wishes to incorporate products other than those named in the Base Bid Specifications they shall submit a request for approval of equivalency in writing no later than (10) ten calendar days prior to bid date. Substitutions after this may be refused at Engineers option. Equivalentents will ONLY be considered approved when listed by addendum.
 - 1. In proposing a substitution prior to or subsequent to receipt of bids, include in such bid the cost of altering other elements of this project, including adjustments in mechanical or electrical service requirements necessary to accommodate such substitution.
- G. Within 10 working days after bids are received, the apparent low bidder shall submit to the Architect-Engineer for approval, three copies of a list of all major items of equipment they intend to provide. Within 30 working days after award of Contract, Contractor shall submit shop drawings for equipment and materials to be incorporated in work, for Architect-Engineer review. Where 30-day limit is insufficient for preparation of detailed shop drawings on major equipment or assemblies, Contractor shall submit manufacturer's descriptive catalog data and indicate date such detailed shop drawings will be submitted along with manufacturer's certification that order was placed within 30 working day limit.

1.12. ELECTRONIC PLAN FILES

- A. Electronic files of the contract documents may be available from the Engineer to successful bidders and manufacturers for a fee of \$50 per sheet, \$100 minimum and \$25 email/shipping charge. A release of liability form will be required along with payment prior to release of files.

1.13. OPENINGS, ACCESS PANELS AND SLEEVES

- A. This Contractor shall include the installation of all boxes, access panels and sleeves for openings required to install this work, except structural openings incorporated in the structural drawings. Sleeves shall be installed for all conduits passing through structural slabs and walls. Contractor shall set and verify the location of sleeves that pass through beams, as shown on structural plans. All floor and wall penetrations shall be sealed to meet fire-rating requirements.

- B. All penetrations through interior or exterior and rated or non-rated walls and floors shall be appropriately sealed prevent entry and movement of rodents and insects. Contractor shall coordinate their work with all other trades.

1.14. ARCHITECTURAL VERIFICATION AND RELATED DOCUMENTS

- A. Contractor shall consult all Architectural Drawings and specifications in their entirety incorporating and certifying all millwork, furniture, and equipment rough-in including utility characteristics such as voltage, phase, amperage, pipe sizes, duct sizes, including height, location and orientation. Shop drawings incorporating these requirements should be submitted to the Architect for approval prior to installation or rough in.

1.15. EXTENT OF CONTRACT WORK

- A. Provide electrical systems indicated on drawings, specified or reasonably implied. Provide every device and accessory necessary for proper operation and completion of electrical systems. In no case will claims for “Extra Work” be allowed for work about which Electrical Contractor could have been informed before bids were taken.
- B. Where specific information for devices, lights or equipment shown on the plans is missing, provide an allowance in the contract amount for furnishing a product reasonably implied by the level of other devices, lights and equipment provided in the contract documents.
- C. Electrical Contractor shall be familiar with equipment provided by other Contractors that require electrical connections and control. Follow circuiting shown on drawings for lighting, power and equipment connections.
- D. Make required electrical connections to equipment provided under Architectural and Mechanical divisions of this project. Receive and install electric control devices requiring field installation, wiring, and service connection. Equipment supplied by the automatic temperature control contractor shall be installed by the mechanical or automatic temperature control subcontractor. Make required internal field wiring modifications indicated on wiring diagrams of factory installed control systems for control sequence specified. These field modifications shall be limited to jumper connections and connection of internal wiring to alternate terminal block lugs. The cost for field modifications requiring rewiring of factory installed control systems for equipment provided by General or Mechanical Contractors shall be included in base bid of the respective contractor. All temperature control wiring shall be by a licensed electrician under the supervision of temperature control contractor.
- E. Check electrical data and wiring diagrams received from Mechanical Contractor of compliance with project voltages, wiring, controls and protective devices shown on electrical drawings. Promptly bring discrepancies found to attention of Architect-Engineer for a decision.
- F. Provide safety disconnect switches, contactors, and manual and magnetic motor starters for mechanical and electrical equipment requiring such devices. Omit these devices where included as part of factory installed prewired control systems provided with mechanical equipment. With exception of factory installed devices, provide safety disconnect switches, contacts and motor starters by one manufacturer to allow maximum interchangeability of repair parts and accessories for these devices.
- G. To maximum extent possible electrical controls in boiler rooms, equipment rooms, and control rooms shall be grouped in accessible locations and arranged according to function. Where possible use group control panels and combination starters in lieu of individually enclosed devices.

1.16. CODES, ORDINANCES, RULES AND REGULATIONS

- A. Provide work in accordance with applicable rules, codes, ordinances and regulations of Local, State, Federal Governments, and other authorities having lawful jurisdiction.
- B. Conform to latest editions and supplements of following codes, standards or recommended practices.
- C. BUILDING CODES:
 - 1. International Building Codes (2018 version of applicable codes)

D. SAFETY CODES:

1. National Electrical Safety Code Handbook H30 - National Bureau of Standards
2. Occupational Safety and Health Standard (OSHA) Department of Labor
3. Safety Code for Elevators ANSI A17.1

E. NATIONAL FIRE CODES AND STANDARDS:

1. NFPA No. 70 National Electrical Code
2. NFPA No. 72 National Fire Alarm and Signaling Code
3. NFPA No. 90A Air Conditioning & Ventilation Systems
4. NFPA No. 101 Life Safety Code

F. UNDERWRITERS LABORATORIES INC.:

1. All materials, equipment and component parts of equipment shall bear UL labels whenever such devices are listed by UL.

G. MISCELLANEOUS CODES:

1. ANSI A117.1 - Handicapped Accessibility
2. Americans with Disabilities Act (ADA)

H. ENERGY EFFICIENCY REQUIREMENTS:

1. All electrical systems and components shall be manufactured and installed in compliance with ASHRAE 90.1 – 2019 and latest adopted version of IECC.

1.17. STANDARDS

- A. Drawings and specifications indicate minimum construction standard, should any work indicated be sub-standard to any ordinances, laws, codes, rules or regulations bearing on work, Contractor shall promptly notify Architect/Engineer in writing before proceeding with work so that necessary changes can be made. However, if Electrical Contractor proceeds with work knowing it to be contrary to any ordinances, laws, rules, and regulations he shall thereby have assumed full responsibility for and shall bear all costs required to correct non-complying work.

1.18. PERMITS/FEES

- A. Electrical Contractor shall secure and pay for necessary permits and certificates of inspection required by governmental ordinances, laws, rules or regulations. Keep a written record of all permits and inspection certificates and submit two copies to Architect/Engineer with request for final review.
- B. Contractor shall include in bid any charges by local utility providers to establish new services to the structure. Coordinate with the utility suppliers to verify exact which part of the work is to be performed by whom.

PART 2 - PRODUCTS

- A. Not Used

PART 3 - EXECUTION**3.1. SUBMITTALS**

- A. Contractor shall furnish submittals of all materials and equipment required by the specifications. Refer to each specification section for the submittals (if any) required for that section.
- B. Submittal format shall be as indicated below. Submittals not meeting these requirements will be returned without action for re-submittal.
 1. Submittals shall be furnished in an Adobe PDF format.
 2. Submittals shall be per individual submittal section, as listed in the table of contents. All required submittals within that section shall be grouped together in a single submittal.

- a. Furnishing submittals by division or by individual item may result in delayed reviewing of the submittal(s) due to additional administrative time required to process the large size and/or quantity of files.
 3. Submittals shall have a cover page containing the following information: The project name, the applicable specification section and paragraph, the submittal date, and the Contractor's stamp (see below for requirements).
 4. Mark each submitted item as applicable with scheduled mark, name, etc. corresponding to the plans.
 5. Where generic catalog cuts are submitted for review, conspicuously mark or provide schedule of equipment, capacities, controls, fitting sizes, etc. that are to be provided. Each catalog sheet shall bear the equipment manufacturer's name and address.
 6. Where equipment submitted does not appear in base specifications or specified equivalent, mark submittals with applicable alternate numbers, change order number or letters of authorization.
 7. All submittals on materials and equipment listed by UL shall indicate UL approval on submittal.
- C. Contractor review:
1. Contractor shall check all submittals to verify that they meet specifications and/or drawings requirements before forwarding submittals to the Architect-Engineer for their review. All submittals submitted to Architect-Engineer shall bear contractor's approval stamp that shall indicate that Contractor has reviewed submittals and that they meet specification and/or drawing requirements. Contractor's submittal review shall specifically check for but not be limited to the following: equipment capacities, physical size in relation to space allowed; electrical characteristics, provisions for supply, return and drainage connections to building systems. All submittals not meeting Contractor's approval shall be returned to their supplier for re-submittal.
 2. No submittals will be considered for review by the Architect-Engineer without Contractor's approval stamp, or that have extensive changes made on the original submittal as a result of the Contractor's review.
 3. Before submitting shop drawings and material lists, verify that all equipment submitted is mutually compatible and suitable for the intended use. Verify that all equipment will fit the available space and allow ample room for maintenance. If the size of equipment furnished makes necessary any change in location, or configuration, submit a shop drawing showing the proposed layout.
- D. Review Schedule:
1. The shop drawing / submittal dates shall be at least as early as required to support the project schedule and shall also allow for two weeks Architect-Engineer review time plus a duplication of this time for re-submittal if required.
 2. Submittal of all shop drawings as soon as possible after permitting approval but before construction starts is preferred.
 3. Approval of shop drawings submitted prior to receipt of a permit for that respective scope of work should be considered conditional pending review/approval of the construction documents by the AHJ. Changes required to the submittal as a result of permitting comments received after architect's/engineer's review shall not be a justification for a change in price.
 4. Any time delay caused by correcting and re-submitting submittals/shop drawings will be the Contractor's responsibility.
- E. The Architect's-Engineer's checking and subsequent review of such drawings, schedules, literature, or illustrations shall not relieve the Contractor from responsibility for deviations from Drawings or Specifications unless he has, in writing, called the Architect's-Engineer's attention to such deviations at the time of submission, and secured their written approval; nor shall it relieve the contractor from

responsibility for errors in dimensions, details, size of members, or omissions of components for fittings; or for coordinating items with actual building conditions and adjacent work.

- F. Any corrections or modifications made by the Architect-Engineer shall be deemed acceptable to the Contractor at no change in price unless written notice is received by the Architect-Engineer prior to the performance of any work incorporating such corrections or modifications.
- G. Submittals that require re-submission shall have the items that were revised "flagged" or in some other manner marked to call attention to what has been changed.
- H. Coordination
 - 1. After shop drawings have been reviewed and approved by all parties, transmit a set of submittals to each other trade (eg Plumbing, Mechanical, Electrical, Controls, etc) that will interface with installation. Each other contractor shall review the submittal for coordination and return a stamped submittal indicating they have reviewed the submittal for coordination purposes.

3.2. SHOP DRAWINGS

- A. Shop drawings shall meet all of the above requirements for submittals.
- B. Contractor shall submit Adobe PDF sets of all fabrication drawings. Cost of drawing preparation, printing and distribution shall be paid for by the contractor and included in his base bid.
- C. No work shall be fabricated until Architect-Engineer's review has been obtained.
- D. Electrical equipment location and conduit coordination shop drawings for conduit fabrication and electrical equipment clearances shall be a minimum of 1/4" scale. Shop drawings shall not be a reproduction of the contract document and shall show details of the following: Fabrication, assembly, and installation, including plans, elevations above finished floor, sections, components, and attachments to other work.

3.3. OPERATING AND MAINTENANCE INSTRUCTIONS (O & M MANUALS)

- A. Submit with shop drawings of equipment, three sets of operating and maintenance instructions and parts lists for all items of equipment provided. Instructions shall be prepared by equipment manufacturer.
- B. Keep in safe place, keys and wrenches furnished with equipment under this contract. Present to Owner and obtain receipt for same upon completion of project.
- C. Prepare a complete brochure, covering systems and equipment provided and installed under his contract. Submit brochures to Architect/Engineer for review before delivery to Owner. Contractor at his option may prepare this brochure or retain an individual to prepare it for him. Include cost of this service in bid. Brochures shall contain following:
 - 1. Certified equipment drawings/or catalog data with equipment provided clearly marked as outlined under Section this specification.
 - 2. Complete installation, operating, maintenance instructions and parts lists for each item of equipment.
 - 3. Record copy of all submittals indicating actual equipment installed indicating options, characteristics. Copies of submittals shall bear the stamps of all parties that reviewed submittals.
 - 4. Special emergency operating instructions with a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to various parts of system.
 - 5. Record Set Drawings: The Contractor shall mark up a set of contract documents during construction noting all changes and deviations including change orders. These will be delivered to Architect at end of the project. After the originals are changed to reflect the blue line set, a copy shall be included in the brochure.
 - 6. Provide brochure bound in black vinyl three-ring binders with metal hinge. Reinforce binding edge of each sheet of loose-leaf type brochure to prevent tearing from continued usage. Clearly print on label insert of each brochure:

- a. Project name and address.
- b. Section of work covered by brochure, i.e., Electrical.

3.4. RECORD DOCUMENTS

- A. During construction, keep an accurate record of all deviations between the work as shown on Drawings and that which is actually installed. Keep this record set of prints at the job site for review by the Architect/Engineer.
- B. Upon completion of the installation and acceptance by the owner, transfer all record drawing information to one neat and legible set of prints. Then deliver them to the Architect/Engineer for transmittal to the Owner.
- C. Provide one copy of on high quality heavy weight presentation type paper. Blueprints or other media which fade shall not be used.
- D. Provide one electronic scanned version of record documents in Adobe PDF format – PDFs may be submitted on electronic media (DVD, USB) or via an FTP or other file sharing site. Provide electronic copies in conjunction with hard copy documents.

3.5. PREMIUM TIME WORK

- A. The following Work shall be performed at night or weekend other than holiday weekends as directed and coordinated with the Owner.
 1. All tie-in, cut-over and modifications to the existing electrical system and other existing system requiring tie-ins or modifications shall be arranged and scheduled with the Owner to be done at a time as to maintain continuity of the service and not interfere with normal building operations.

3.6. CLEANING UP

- A. Contractor shall take care to avoid accumulation of debris, boxes, crates, etc., resulting from the installation of his work. Contractor shall remove from the premises each day all debris, boxes, etc., and keep the premises clean.
- B. Contractor shall clean up all fixtures and equipment at the completion of the project.
- C. All switchboards, panelboards, wireways, trench ducts, cabinets and enclosures shall be thoroughly vacuumed clean prior to energizing equipment and at the completion of the project. Equipment shall be opened for observation by the Architect/Engineer as required.

3.7. WATERPROOFING

- A. Avoid, if possible, the penetration of any waterproof membranes such as roofs, machine room floors, basement walls, and the like. If such penetration is necessary, perform it prior to the waterproofing and furnish all sleeves or pitch-pockets required. Advise the Architect/Engineer and obtain written permission before penetrating any waterproof membrane, even where such penetration is shown on the Drawings.
- B. If Contractor penetrates any walls or surfaces after they have been waterproofed, he shall restore the waterproof integrity of that surface as directed by the Architect/Engineer at his own expense

3.8. CUTTING AND PATCHING

- A. Contractor shall do cutting and patching of building materials required for installation of work herein specified. Remove walls, ceilings and floors (or portions thereof) necessary to accomplish scope of work. Do not cut or drill through structural members including wall, floors, roofs, and supporting structure, without the Architect's and Structural Engineer's approval and in a manner approved by them.
- B. Make openings in concrete with concrete hole saw or concrete drill. Use of star drill or air hammer for this work will not be permitted.
- C. Patching shall be by the contractors of the particular trade involved, shall match the existing construction type, quality, finish and texture, and shall meet approval of Architect-Engineer. Damage to building finishes, caused by installation of electrical work shall be repaired at

Contractor's expense to approval of Architect-Engineer.

3.9. SETTING, ADJUSTMENT AND EQUIPMENT SUPPORTS

- A. Work shall include mounting, alignment and adjustment of systems and equipment. Set equipment level on adequate foundations and provide proper anchor bolts and isolation as shown or specified. Level, shim, and grout equipment bases as recommended by manufacturer. Mount motors, align and adjust drive shafts and belts according to manufacturer's instruction. Equipment failures resulting from improper installation or field alignment shall be repaired or replaced by Contractor at no cost to Owner.
- B. Floor or pad mounted equipment shall not be held in place solely by its own dead weight. Include anchor fastening in all cases.
- C. Provide electrical floor mounted equipment with 3-1/2" high concrete bases unless shown or specified otherwise. Electrical contractor shall size all pads. General contractor shall form all pads, provide and place all concrete for said pads. Individual concrete pad shall be no less than 4" wider and 4" longer than equipment, and shall extend no less than 2" from each side of equipment.
- D. Provide each piece of equipment or apparatus suspended from ceiling or mounted above floor level with suitable structural support, platform or carrier in accordance with best recognized practice. Electrical contractor shall arrange for attachment to building structure, unless otherwise indicated on drawings or as specified. Provide hangers with vibration eliminators where required. Contractor shall verify that structural members of building are adequate to support equipment. Submit details of hangers, platforms and supports together with total weights of mounted equipment to Architect/Engineer for review before proceeding with fabrication or installation.
- E. Provide 3-1/2" high concrete housekeeping pad as specified above where two or more conduits penetrate floor below panelboards.

3.10. START-UP, CHANGEOVER, TRAINING AND OPERATION CHECK

- A. Electrical Contractor shall be responsible for training Owner's operating personnel to operate and maintain systems and equipment installed. Keep a record of training provided to Owner's personnel listing the date, subject covered, instructor's name, names of Owner's personnel attending and total hours of instruction given each individual.
- B. All owner-training sessions shall be orderly and well organized and shall be video recorded digitally. At the end of the owner training, the "training" session recording shall be transmitted to the owner via DVD and shall become property of the owner.

3.11. FINAL CONSTRUCTION REVIEW

- A. At final construction review, Electrical Contractor and the major sub-contractors shall be present or shall be represented by a person of authority. Each Contractor shall demonstrate, as directed by Architect/Engineer, that the work complies with purpose and intent of plans and specifications. Respective Contractor shall provide labor, services, instruments or tools necessary for such demonstrations and tests.

END OF SECTION 260010

SECTION 260011 – BASIC ELECTRICAL MATERIALS AND METHODS**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 260010.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION**3.1. NEUTRAL AND GROUND WIRES**

- A. Where individual circuit homeruns (hots, neutral, and ground as part of a single circuit) are indicated on the plans serving lighting and branch circuit receptacle loads, these shall be individual circuits with individual neutrals (no sharing of neutrals and/or grounds).
- B. Where shared circuit homeruns (hots, neutral, and ground as part of separate circuits) are indicated on the plans, these shall be allowed to share one (common) ground for three (3) circuits from different phases occurring in one (1) conduit run. When additional circuits occur in conduit run, additional ground wires shall be installed. Conduit shall be upsized and conductors shall be de-rated based on NEC current carrying conductor tables, counting all hots and neutrals as current carrying conductors.
 - 1. No sharing of neutral conductors is allowed in multi-wire branch circuit homeruns, unless the installation meets the requirements of 2014 NEC 210.4(B), and is specifically approved by the engineer of record.

3.2. TESTS RECORDING, REPORTING TESTS AND DATA

- A. Record nameplate horsepower, amperes, volts, phase service factor and other necessary data on motors and other electrical equipment furnished and/or connected under this contract.
- B. Record motor starter catalog number, size and rating and/or catalog number of thermal-overload units installed in all motor starters furnished and/or connected under this contract. See motor starter specification for instructions for proper sizing of thermal-overload units.
- C. Record amperes-per-phase at normal or near-normal loading of each item of equipment furnished and/or connected.
- D. Record correct readings of each feeder conductor after energized and normally loaded, and again after balancing of feeder loads as required by current readings.
- E. Record voltage and ampere-per-phase readings taken at service entrance equipment after completion of project with building operating at normal electrical load.
- F. Short-Circuit Calculations
 - 1. Contractor shall contact utility company after utility company design is complete and determine exact available fault current in amperes at the point of utility connection (Service Point).
 - 2. Contractor shall utilize the above available fault current to calculate the available fault current in amperes (RMS-SYM) at the service equipment.
 - 3. The available fault current shall be labeled on the service equipment – refer to Section 260553.
- G. Submit at least two (2) typewritten copies of data noted above to Architect-Engineer for review prior to final inspection.
- H. Keep a record of all deviations made from routes, locations, circuiting, etc. shown on contract drawings. Prior to final inspection submit one new set of project drawings with all deviations and changes clearly indicated.

3.3. CLEANING AND PAINTING OF MATERIALS AND EQUIPMENT

- A. Before energizing switchboards, transformers, panelboards, starters, variable frequency drive and other similar electrical equipment, Contractor shall thoroughly vacuum out all dirt, dust and debris from inside of equipment and shall thoroughly clean outside and inside of equipment.
- B. Touch-up painting and refinishing of factory applied finishes shall be by Electrical Contractor. Contractor shall be responsible for obtaining proper type of painting materials and color from equipment manufacturer.
- C. Unless specified otherwise factory built equipment shall be factory painted. Paint shall be applied over surfaces only after they have been properly cleaned and coated with a corrosion resistant primer.
- D. After installation, damage to painted surfaces shall be properly prepared and primed with primers equal to factory materials. Finish coating shall be same color and type as factory finish.
- E. Where extensive refinishing is required equipment shall be completely repainted.

3.4. EXCAVATION AND BACKFILL

- A. Perform necessary excavation to receive work. Provide necessary sheathing, shoring, cribbing, tarpaulins, etc. for this operation, and remove at completion of work. Perform excavation in accordance with appropriate section of these specifications, and in compliance with OSHA Safety Standards.
- B. Excavate trenches of sufficient width to allow ample working space, and no deeper than necessary for installation work.
- C. Conduct excavations so no walls or footings are disturbed or injured.
- D. Backfill excavations made under or adjacent to footing with selected earth or sand and tamp to compaction required by A/E.
- E. Mechanically tamp backfill under concrete and pavings in 6” layers to 95% standard density, Reference Division 2.
- F. Backfill trenches and excavations to required heights with allowance made for settlement.
- G. Tamp fill material thoroughly and moistened as required for specified compaction density.
- H. Dispose of excess earth, rubble and debris as directed by Architect.
- I. When available, refer to test hole information on architectural drawings or specifications for types of soil to be encountered in excavations.

3.5. FIRE BARRIERS

- A. Provide sleeves through all fire-rated walls and fill voids surrounding sleeves and interior to sleeves around piping with Nelson “Flameseal” fire stop putty with U.L. listed 3 hour rating installed as per manufacturers recommendations.
- B. Equivalent by Dow, Chemelex, 3M.
- C. All holes or voids created by the electrical contractor to extend conduit or wiring through fire rated floors and walls shall be sealed with an intumescent material capable of expanding up to 8 to 10 times when exposed to temperatures of 250 degrees F. It shall have ICBO, BOCAI and SBCCI (NRB 243) approved ratings to 3 hours per ASTM E-814 (UL 1479). Acceptable Material: 3M Fire Barrier Caulk, Putty, Strip and sheet forms.

3.6. TEMPORARY COVERINGS

- A. Provide temporary covering over all electrical panels, distribution panelboards, outlet boxes and other equipment as required to keep same free from damage due to moisture, plaster, paint, concrete or other foreign materials. Any equipment with finish damaged by moisture, paint, plaster or other foreign materials shall be cleaned and refinished as directed by the Architect without additional cost to the Owner.
- B. All temporary openings in conduits shall be covered with metal or plastic caps.

3.7. PROTECTIVE COVERS

- A. Provide protective wire guards over all wall mounted and ceiling mounted devices subject to damage in areas such as gymnasiums, shops and similar occupancies.

- B. Provide lockable covers over thermostats and similar wall mounted devices where items are located in public spaces but should not be operable by the general public.

3.8. SLEEVES

- A. Provide proper type and size sleeves to General Contractor for electrical ducts, busses, conduits, etc. passing through building construction. Supervise installation to insure proper sleeve location. Unless indicated or approved install no sleeves in structural members.
- B. Provide cast iron sleeves extending 1 inch above finished floor where sleeves pass through floors subject to flooding such as toilet rooms, bathrooms, equipment rooms and kitchen. Seal opening between pipe and sleeve with Thunderline Corp. Link Seal.
- C. Unless specified otherwise provide 18 gauge galvanized sheet metal sleeves through floors and non-bearing walls. Where piping passes through exterior walls, equipment room walls, air plenum walls and walls between areas that must be isolated from occupied areas, seal space between sleeves and piping, air or water tight are required with Thunderline Corp. Link Seal.
- D. Provide O-Z Electrical Manufacturing Co., Inc. Type “FSK” or “WSK” or equivalent thruwall and floor seals where conduits pass through concrete foundation walls below grade.
- E. Provide Zurn Z-195 or equivalent flashing sleeve through walls and floors with waterproof membrane. Seal annular space between conduit and sleeve with Thunderline Link Seal or O-Z type CSM sealing bushing.

END OF SECTION 260011

SECTION 260013 – PROJECT COORDINATION**PART 1 GENERAL****1.1. RELATED DOCUMENTS**

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

1.2. SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination Drawings.
 - 2. Administrative and supervisory personnel.
 - 3. Project meetings.
 - 4. Requests for Interpretation (RFIs).
 - 5. Wiring of equipment furnished by others
- B. Each related sub-contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.

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, that 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. 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. Delivery and processing of submittals.
 - 2. Progress meetings.
 - 3. Preinstallation conferences.
 - 4. Project closeout activities.
 - 5. Startup and adjustment of systems.

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.

1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate required installation sequences.
 - c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 2. Sheet Size: At least 8-1/2 by 11 inches but no larger than 30 by 40 inches. Format shall be PDF or other electronic format to facilitate multiple user commenting and sharing easily.
 3. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including project managers, superintendent and other personnel in attendance at Project site to the General Contractor and other major subcontractors. Identify individuals and their duties and responsibilities; list email addresses and telephone numbers. Update the list as required during the project if personnel change.

1.5. COORDINATION

- A. Certain materials will be provided by other trades. Examine the Contract Documents and reviewed record Submittals to ascertain these general requirements. Contract Documents reflect a basis of design and may not reflect actual equipment or items being utilized.
- B. Carefully check space requirements with other trades and the physical confines of the area to insure that all material can be installed in the spaces allotted thereto including finished suspended ceilings and the spaces within the existing building. Make modifications thereto as required and approved.
- C. Transmit to other trades all information required for work to be provided under their respective Sections in ample time for installation.
- D. Wherever work interconnects with work of other trades, coordinate with other trades to insure that all trades have the information necessary so that they may properly install all the necessary connections and equipment. Identify all items of work that require access so that the ceiling trade will know where to install access doors and panels.
- E. Obtain equipment submittal information for all pieces of equipment to be connected to from other trades that clearly indicates all connection requirements, locations, sizes, and similar requirements. Obtain this information in ample time to coordinate other trade submittals and equipment coordination. Where requirements differ from that on plans or differs from provisions made in the work, immediately notify the Architect/Engineer. Do not proceed with work that is incompatible with equipment provided.
- F. Coordinate, project and schedule work with other trades in accordance with the construction sequence.
- G. Coordinate with the local Utility Companies to their requirements for service connections and provide all necessary materials, labor and testing.
- H. Coordinate with contractors for work under other Divisions of this specification for all work necessary to accomplish this contractor's work.
- I. Conduct a coordination meeting after reviewing all other trade coordination drawings with other relevant trades. This meeting shall be held to prevent conflicts during construction. Each major relevant subcontractor shall attend this meeting. Report any potential conflicts or clearance problems to Architect/Engineer after meeting.
- J. Adjust location of piping, ductwork, conduit, wiring, etc. to prevent interferences, both anticipated and encountered. Determine the exact route and location of each item prior to fabrication.

1. Right-of-Way:

- a. Lines that pitch have the right-of-way over those that do not pitch. For example: steam, condensate, and plumbing drains normally have right-of way. Lines whose elevations cannot be changed to have right-of-way over lines whose elevations can be changed.
- b. Make offsets, transitions and changes in direction in raceways as required to maintain proper headroom in pitch of sloping lines whether or not indicated on the Drawings.

1.6. DRAWINGS AND FILES.

- A. The Drawings show only the general run of MEP systems, equipment, fixtures, piping and ductwork and other components as well as approximate location of items such as outlets, switches, diffusers, lights, and equipment connections, etc. Coordinate all exact locations of items with other trades, architectural elevations, equipment requirements, owner requirements, ceilings, access, serviceability, etc. All such modifications and coordination shall be made without additional cost to the Owner. Any significant changes in location of items necessary in order to meet field conditions shall be brought to the immediate attention of the Architect/Engineer and receive his approval before such alterations are made
- B. Wherever the work is of sufficient complexity, additional Detail Drawings to scale similar to that of the bidding Drawings, prepared on tracing medium of the same size as Contract Drawings. With these layouts, coordinate the work with the work of other trades. Such detailed work to be clearly identified on the Drawings as to the area to which it applies. Submit for review Drawings clearly showing the work and its relation to the work of other trades before commencing shop fabrication or erection in the field. Attend meetings with other trades to review all documents.
- C. When directed by the General Contractor for areas of necessary coordination provide 3D building modelling coordination files and documents with other trades. Transmit information electronically and attend meetings as directed by the G/C as well as take part in coordination activities and documentation. Contractor shall be required to generate their own electronic files for this process.

1.7. PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.

- g. Submittals.
 - h. Possible conflicts.
 - i. Compatibility problems.
 - j. Time schedules.
 - k. Manufacturer's written recommendations.
 - l. Warranty requirements.
 - m. Compatibility of materials.
 - n. Space and access limitations.
 - o. Regulations of authorities having jurisdiction.
 - p. Testing and inspecting requirements.
 - q. Installation procedures.
 - r. Coordination with other work.
 - s. Required performance results.
 - t. Protection of adjacent work.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to 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.
- C. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contractor is on time, ahead or behind schedule, in relation to Construction Schedule. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time. Discuss impact of various contractor schedules upon other contractors and how to remedy impacts.
 - b. Review present and future needs of each contractor present, including the following:
 - i. Interface requirements.
 - ii. Sequence of operations.
 - iii. Status of submittals.
 - iv. Deliveries.
 - v. Off-site fabrication.
 - vi. Access.
 - vii. Quality and work standards.
 - viii. Change Orders.
 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.8. REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI.
1. Submit Contractor's suggested solution(s) to RFI. If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 2. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

PART 2 PRODUCTS (Not Used)**PART 3 EXECUTION (Not Used)****3.1. EQUIPMENT FURNISHED BY OTHERS**

A. Description:

1. Items furnished by other trades (mechanical or plumbing contractor, etc.) such as mechanical/plumbing equipment, line voltage actuators, VFDs (not by electrical contractor), etc.
2. Elevator equipment
3. Equipment furnished by general contractor
4. Equipment furnished by owner

B. General

1. Fully review manufacturer's installation instructions for equipment. Installation of all related electrical items noted below shall be per same.
 - a. Electrical contractor shall obtain same from others if not readily available.

C. Disconnecting Means

1. An approved disconnecting means shall be provided at all equipment and shall serve to disconnect power from same.
2. Disconnecting means may be a switch, circuit breaker, or a cord-and-plug type connection.
3. Disconnecting means shall be within sight of equipment, as defined by NEC.
4. Disconnect switches may be non-fused, unless specifically shown fused on the plans or otherwise required by code to be fused.
 - a. All disconnect switches serving elevator equipment shall be provided with an overcurrent protective device.

D. Wiring of Equipment

1. Wire sizes used shall be as directed on plans or installation instructions, whichever is greater. Contractor shall notify engineer of any deviations from wire sizes listed on construction documents.
2. Wiring shall include a neutral conductor where shown on plans or required by installation instructions.
 - a. If a neutral conductor is shown on the plans but not required by installation instructions, verify removal of neutral wire with engineer via RFI prior to proceeding.
3. Wiring of elevators and other such equipment shall account for voltage drop limitations of equipment.
4. Wiring of VFDs shall be as follows:
 - a. Secondary VFD cables shall be symmetrically shielded and grounded or, where the length of the conductors is less than the VFD manufacturer's recommended maximum, be copper conductors installed in metallic conduit. Same shall not be

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installed in the same raceway as other cables or combined in wire gutters or cable trays

END OF SECTION 260013

SECTION 260505 – ELECTRICAL DEMOLITION**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 260010.
- B. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SCOPE

- A. Demolition work to be performed whether shown or not on the drawings. Disconnect and remove any lights, equipment, conduit, wiring, devices, etc. not required to remain and/or required to be removed to accommodate new construction.

1.3. SUMMARY

- A. This Section requires the selective removal and subsequent offsite disposal of the following:
 - a. Mechanical and electrical equipment, devices, piping, conduits, ductwork, insulation, lighting, etc in existing building as required to accommodate new construction.
 - b. Removal of MEP items in interior partitions.
 - c. Removal and protection of existing fixtures, materials, and equipment items to be removed, salvaged, relocated, reinstalled, etc.

1.4. SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Schedule indicating proposed sequence of operations for selective demolition work to Architect for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
 - 1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
 - 2. Coordinate with Owner's continuing occupation of portions of existing building and with Owner's partial occupancy of completed remodeled areas.
- C. Photographs of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with Architect prior to start of work.

1.5. JOB CONDITIONS

- A. Occupancy: Owner will occupy portions of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in such a manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities that will affect Owner's normal operations.
- B. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished. Conditions existing at time of Contractor's inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.
- C. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed. Storage or sale of removed items on site will not be permitted.
- D. Protections: Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.

- a. Provide protective measures as necessary and required to provide free and safe passage of Owner's personnel and general public to any occupied portions of building.
 - b. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain.
 - c. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
 - d. Construct temporary insulated dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks.
 - e. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
 - f. Remove protections at completion of work.
2. Damages: Promptly repair damages caused to adjacent facilities by demolition work.
 3. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- E. Flame Cutting:
1. Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations.
- F. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
- G. Maintain fire protection services during selective demolition operations.
- H. Environmental Controls:
- a. Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing and/or approved regulations pertaining to environmental protection. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1. PREPARATION

- A. General: Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
- B. Cease operations and notify Architect immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
- C. Provide all necessary temporary supports of items and systems to remain that were supported from or otherwise affected by removal of other building components. Maintain integrity of all systems to remain and protect during the construction process.
- D. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes

to any occupied portions of the building.

- a. Where selective demolition occurs immediately adjacent to any occupied portions of the building, construct dust-proof partitions of minimum 4-inch studs, 5/8-inch drywall (joints taped) on occupied side, 1/2-inch fire-retardant plywood on demolition side. Fill partition cavity with sound-deadening insulation as required by Architect.
 - b. Provide weatherproof closures for exterior openings resulting from demolition work.
- E. Locate, identify, stub off, and disconnect utility services that are not indicated to remain. Provide bypass connections as necessary to maintain continuity of service to any occupied areas of building. Provide minimum of 72 hours advance notice to Architect if shutdown of service is necessary during changeover.

3.2. DEMOLITION

- A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.
1. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.
 2. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
 3. Provide services for effective air and water pollution controls as required.
 4. Completely fill below-grade areas and voids resulting from demolition work. Provide fill consisting of approved earth, gravel, or sand, free of trash and debris, stones over 6 inches in diameter, roots, or other organic matter.
- B. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to architect in written accurate detail. Pending receipt of directive from Architect, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.3. DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove debris, rubbish, and other materials resulting from demolition operations from building site. Transport and legally dispose off site.
- B. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
- C. Burning of removed materials is not permitted on Project site.

3.4. CLEANUP AND REPAIR

- A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION 260505

SECTION 260519 – WIRE AND CABLE

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. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.3. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency.
- C. Field quality-control test reports.

1.4. QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

1.5. COORDINATION

- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1. CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Southwire Company.
 - 2. General Cable Corporation.
 - 3. Encore Wire Corporation.
 - 4. AFC Cable Systems, Inc. (Multiconductor cable only)
- B. Copper Conductors: Comply with NEMA WC 70.
- C. Aluminum Conductors: Comply with NEMA WC 70.
 - a. Same shall be compacted aluminum (Stabiloy)
- D. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN-2.
 - 1. Provide consistent color coding of all circuits as follows:

Phase	Distribution System	
	120/208	277/480
A	Black	Brown
B	Red	Orange
C	Blue	Yellow
N	White	Gray
Ground	Green	Green w/ Stripe ¹

Notes:

1) Stripe shall be white or yellow in color.

E. Multiconductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC with ground wire.

2.2. CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cable manufacturers listed above under 2.1, Item A.
2. Hubbell Power Systems, Inc.
3. O-Z/Gedney; EGS Electrical Group LLC.
4. 3M; Electrical Products Division.
5. Tyco Electronics Corp.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1. CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

1. Aluminum conductors acceptable only when specifically shown/scheduled on drawings.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

1. Aluminum conductors are not permitted for branch circuit wiring.

3.2. CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Provide insulation / cable types for conductors as follows:

Application	Insulation / Cable Type		
	THHN/THWN- 2 ¹	XHHW- 2 ¹	MC Cable 3
Service Entrance	X ²	X	
Feeders:			
Exposed, Exterior	X ²	X	
Exposed, Interior	X		
Concealed in Ceilings, Walls, Partitions, and Crawlspace	X		
Concealed in Concrete, below Slabs-on- Grade, and Underground	X ²	X	
Branch Circuits:			
Exposed, Exterior	X ²	X	
Exposed, Interior - Including Crawlspace	X		
Concealed in Ceilings, Walls, and Partitions	X		X
Concealed in Concrete, below Slabs-on- Grade, and Underground	X ²	X	

Notes:

- 1) Single conductors in raceway. Refer to Section 260533 - Raceway & Boxes for acceptable raceway types/applications.
- 2) THHN/THWN-2 is acceptable for these installations at contractor's discretion.
- 3) Metal Clad (MC) cable installations shall be in accordance with the following:
 - (i) MC cable shall not be used for homeruns.

- (ii) MC cable may be used for light fixture and equipment whips in lengths no longer than 6'-0". The use of MC cable from lighting fixture to lighting fixture shall not be allowed.
 - (iii) MC cable shall not be installed in exposed locations for lighting purposes. MC cable may be exposed in mechanical spaces for equipment whips.
- B. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
 - C. Class 1 Control Circuits: Type THHN-THWN-2, in raceway.
 - D. Class 2 Control Circuits: Type THHN-THWN-2, in raceway or Power-limited cable, concealed in building finishes.

3.3. INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables per National Electrical Code requirements.
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.4. CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5. FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
 2. Test Reports: Prepare a written report to record the following:
 - a. Test procedures used.
 - b. Test results that comply with requirements.
 - c. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- C. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

SECTION 260526 – GROUNDING**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 260010.
- B. Reference Section 260519 for general requirements of all conductors.
- C. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. DESCRIPTION OF WORK

- A. Provide grounding electrodes, conductors, connections and equipment to provide a solidly grounded electrical system.

1.3. STANDARDS

- A. Except as modified by governing codes and by the Contract Documents, comply with the latest applicable provisions and latest recommendations of the following:
 - 1. Underwriters Laboratory Standard No. U.L. 467.
 - 2. ANSI C-1 1978.
 - 3. IEEE Standards No. 142-1982, 1100-1992 and No. 80.
 - 4. National Electrical Safety Code.
 - 5. NFPA.

1.4. SUBMITTALS

- A. For each type of product data listed.
- B. Submit test reports certifying resistance values for buried or driven grounds and water pipe grounds.

PART 2 - PRODUCTS**2.1. CONDUCTORS**

- A. Grounding conductor sizes shall be as shown on plans or if not specifically shown shall be no smaller than that required by the NEC.
- B. Insulated Conductors: Annealed tinned copper wire. Size as indicated on Drawings; insulation to conform with requirements of Section 260519.
- C. Bare Copper Conductors:
 - 1. Stranded Conductors: ASTM B 8.
 - 2. Tinned Conductors: ASTM B 33.
- D. Grounding Bus: Rectangular bars of annealed copper, 1/4" by 2" in cross section, unless otherwise indicated; with insulators.

2.2. GROUNDING ELECTRODES

- A. Ground Rods:
 - 1. Copper-clad steel fabricated by molten welding process.
 - 2. Diameter: 5/8 Inch. Use 3/4" for rocky soil.
 - 3. Length: 8 feet.

2.3. CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

PART 3 - EXECUTION

3.1. APPLICATIONS

- A. General:
 1. Where metal raceways, cable trays, cable armor, cable sheath, enclosures, frames, fittings, and other metal non-current-carrying parts are indicated to serve as grounding conductors, same shall be effectively bonded where necessary to assure electrical continuity and the capacity to safely conduct and fault current likely to be imposed on them.
 - a. Any non-conductive paint, enamel, or similar coating shall be removed at threads, contact points, and contact surfaces or be connected by means of fittings so designed as to make such removal unnecessary.
- B. Underground Grounding Conductors: Install bare tinned copper conductor, #2/0 AWG minimum.
 1. Bury at least 24" below grade.
- C. Conductor Terminations and Connections:
 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 2. Underground Connections: Bolted or Welded connectors.
 3. Connections to Structural Steel: Bolted or Welded connectors.
- D. Grounding Bus: Install in electrical service rooms, data rooms, and elsewhere as indicated.
 1. Install bus on insulated spacers a minimum of 1" from wall and 6" above finished floor, unless otherwise indicated.

3.2. EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
 1. Provide low voltage distribution system with a separate green insulated equipment grounding conductor for each single or three-phase feeder.
 2. Branch circuits shall consist of phase and neutral conductors as shown/indicated and a green ground conductor installed in common raceway which shall serve as the equipment grounding conductor.
 - a. Equipment grounding conductors for branch circuit home runs shown on the drawings shall indicate an individual and separate ground conductor for that homerun which shall be terminated at the branch circuit panelboard, switchboard, or other distribution equipment. No sharing of equipment grounding conductors sized according to the size of the overcurrent device and NEC Table 250-122 shall be allowed.
 3. Where ground cable is installed in metallic conduit, bond cable to conduit at both ends.
 4. Connect ground conductors in cables and in conduit to appropriate ground buses (as in switchgear, motor control centers, and distribution panelboards) or directly to metallic enclosure if no ground bus is provided.
 5. Required equipment grounding conductors and straps shall be sized in compliance with N.E.C. Table 250-122.
 6. Equipment grounding conductors shall be provided with green type TW 600 volt insulation. Related feeder and branch circuit grounding conductors shall be connected to ground bus with approved pressure connectors.
 7. Provide feeder servicing several panelboards with a continuous grounding conductor connected to each related panelboard ground bus. Installation shall include necessary

precautions regarding terminations with dissimilar metals.

8. Where parallel feeders are installed in more than one raceway, each raceway shall have a green insulated equipment grounding conductor.

B. Separately Derived Systems

1. Equipment grounding conductors shall be provided for separately derived systems and shall be grounded to building steel, cold water pipes, etc., or an alternate grounding means.

C. Conduit Attachment to Electrical Equipment:

1. Ground conduits to metal framework of electrical equipment with double locknuts or grounding bushings and bonding jumpers unless otherwise noted.
2. Install bonding jumpers at all electrical equipment to provide continuous ground return path through conduit.
3. Install bonding jumpers across expansion fittings between conduit sections for ground path continuity.
- 4.
5. Provide grounding type bushings for conduits terminated through multiple concentric knockouts not fully knocked out, on inside of electrical enclosures. Install bonding jumper between ground bushing and enclosure.

D. Receptacles:

1. Install bonding jumpers between outlet box and receptacle grounding terminal except where contact device or yoke is provided for grounding purposes.

E. Switches

1. Where required, provide grounding clip on each toggle switch. Mount over device mounting strap such that contact is made between mounting strap, screw, faceplate and outlet box.
2. Provide devices with ground screw and bond to switch box.

F. Wireways:

1. Install grounding jumpers for bonding between wireway and other panelboards, conduit, switchgear, motor control centers, and at any other point where solid connection would otherwise not be provided in supporting system to insure continuous ground.

G. Pull Boxes, Junction Boxes and Enclosures:

1. Connect all equipment grounding conductors together and connect to the box.

H. Coordination with Other Trades:

1. Where low-voltage cabling for tele/data, security systems, A/V systems, etc. is not otherwise part of the scope of work indicated herein, electrical contractor shall coordinate required grounding/bonding of these components with the owner's vendor or other subcontractor.
2. Each system of continuous metallic piping and ductwork shall be grounded in accordance with the requirements of the National Electrical Code.
 - a. Portions of these systems which are isolated by flexible connections, insulated couplings, etc. shall be bonded to the equipment ground with a flexible bonding jumper.
3. Mechanical equipment shall be bonded to the building equipment grounding system. This shall include, but not be limited to: fans, pumps, chillers, etc.

3.3. GROUNDING ELECTRODE SYSTEM

A. General:

1. The system neutral shall be grounded at the service entrance only and kept isolated for

grounding systems throughout the building.

3.4. INSTALLATION

- A. Grounding Electrode Conductors: route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2” below finished floor or final grade, unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating (if any).
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.
- D. Grounding and Bonding for Piping:
 - 1. Make connections with clamp type fitting; do not damage water pipe.
 - 2. Bond ground conductor and its conduit to water pipe.

3.5. FIELD QUALITY CONTROL

- A. Resistance Values for System and Equipment Grounds: for each ground rod and ground grid.
 - 1. Acceptable Testing Equipment: Vibroground by Associated Research, Inc.; or Megger Earth Tester by James G. Biddle Co.
 - 2. Method: Three (3) electrode fall of potential as prescribed by instrument manufacturer.
 - 3. Drive additional ground rods spaced eight feet apart, if necessary, until total resistance of system is measured at five ohms or less.

END OF SECTION 260526

SECTION 260529 – HANGERS & SUPPORTS FOR ELECTRICAL SYSTEMS

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. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.
- B. Related Sections include the following:
 - 1. Division 26 Section "Vibration And Seismic Controls For Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3. DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4. PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5. QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

1.6. COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 PRODUCTS

2.1. SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.

- c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 5. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - i. Hilti Inc.
 - ii. ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - iii. MKT Fastening, LLC.
 - iv. Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, [zinc-coated] steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - i. Cooper B-Line, Inc.; a division of Cooper Industries.
 - ii. Empire Tool and Manufacturing Co., Inc.
 - iii. Hilti Inc.
 - iv. ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - v. MKT Fastening, LLC.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 6. Toggle Bolts: All-steel springhead type.
 7. Hanger Rods: Threaded steel.

2.2. FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 EXECUTION**3.1. APPLICATION**

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Support raceways at intervals no greater than ten (10) feet and with one support within three (3) feet of each coupling, box, fitting, or outlet box. Provide one support within three (3) feet of each elbow or bend.
- C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 20 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports.
- E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.
- F. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- G. Use one or two-hole saddle-type clamps where single conduits are exposed below 6'-0" AFF.

3.2. SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 - 6. To Steel:
 - a. Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts
 - b. Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69
 - c. Spring-tension clamps].
 - 7. To Light Steel: Sheet metal screws.

8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3. INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4. CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03."
- C. Anchor equipment to concrete base.
 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

END OF SECTION 260529

SECTION 260533 – RACEWAYS AND BOXES**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 260010.
- B. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. DESCRIPTION OF WORK

- A. Provide complete raceways systems, boxes and fittings for all required electrical systems.

1.3. STANDARDS

- A. Except as modified by governing codes and by the Contract Documents, comply with the latest applicable provisions and latest recommendations of the following:
 - 1. Rigid Steel Conduit
 - a. U.L. Standard UL-6
 - b. A.N.S.I. C80-1
 - c. Federal Specification WW-C-581E
 - 2. Intermediate Metallic Conduit
 - a. U.L. Standard UL-1242
 - b. Federal Specification WW-C-581E
 - 3. Electrical Metallic Tubing
 - a. U.L. Standard UL-797
 - b. A.N.S.I. C80-3
 - c. Federal Specification WW-C-563
 - 4. Flexible Steel Conduit
 - a. U.L. Standard UL-1
 - 5. Liquid Tight Flexible Conduit
 - a. U.L. Standard UL-360
 - 6. Non-Metallic Conduit
 - a. U.L. Standard UL-651
 - b. A.N.S.I. Standard F512
 - c. N.E.M.A. Standard TC-2
 - d. Federal Specifications GSA-FSS and W-C-1094-A
 - 7. Wireways and Auxiliary Gutters
 - a. U.L. Standard UL-870
 - 8. Rigid Aluminum Conduit
 - a. A.N.S.I. C80.5

1.4. SUBMITTALS

- A. Provide manufacturer's catalog cuts of fittings.
- B. Where wireways and/or auxiliary gutters are employed full erection drawings must be submitted. Drawings to include plan views, elevations, size of wireways, type and quantity of conductors proposed to be installed therein, etc.
- C. Indicate duct banks or multi-trade coordinated shop drawings.

- D. Submit shop drawings or catalog descriptive data on boxes exceeding twenty-four (24") inches for any one dimension.
- E. Submit shop drawings or catalog descriptive for floor boxes and accessories.

PART 2 - PRODUCTS

2.1. RACEWAY TYPES

- A. Standard Threaded Rigid Steel Conduit.
 - 1. Rigid conduit heavy wall galvanized.
 - 2. Threaded type fittings: "Erickson" couplings where threaded cannot be used.
- B. Intermediate Metallic Conduit
 - 1. Light weight rigid steel conduit.
 - 2. Threaded type fittings: "Erickson" couplings where threaded cannot be used.
- C. Electrical Metallic Tubing
 - 1. Continuous, seamless tubing, galvanized or sheradized on the exterior, coated on the interior with a smooth hard finish of lacquer, varnish, or enamel.
 - 2. Couplings and connectors:
 - a. Indoor and two (2") inches in size and smaller, shall be steel set-screw type fittings.
 - b. 2-1/2 inch size and larger must employ steel compression gland fittings.
 - c. Outdoor shall be raintight steel compression gland fittings.
 - 3. Indent type fittings shall not be used.
 - 4. All connectors shall have insulated throat.
 - 5. Where installed in slab or concrete work, provide approved concrete tight fittings.
- D. Flexible Steel Conduit
 - 1. Single strip, continuous, flexible interlocked, double-wrapped steel, galvanized inside and outside, forming smooth internal wiring channel.
 - 2. Maximum length: (six 6) feet.
 - 3. Each section of raceway must contain an equipment grounding wire bonded at each end and sized as required. Provide connectors with insulating bushings.
 - 4. Steel squeeze-type or steel set screw type fittings.
- E. Liquid Tight Flexible Electrical Conduit
 - 1. Same as flexible steel conduit except with tough, insert water-tight plastic outer jacket.
 - 2. Cast malleable iron body and gland nut, cadmium plated with one-piece brass grounding bushings which thread to interior of conduit. Spiral molded vinyl sealing ring between gland nut and bushing and nylon insulated throat.
- F. Non-Metallic Raceway
 - 1. Composed of polyvinyl chloride suitable for 90 degrees C. Provide rigid polyvinyl chloride (PVC) type EPC 40 heavy wall plastic conduit meeting current NEMA Standard TC-2. Conduit shall be listed UL 651 for underground and exposed use.
 - 2. Raceway, fittings, and cement must be produced by the same manufacturer who must have had a minimum of ten (10) years experience in manufacturing the products.
 - 3. Materials must have a tensile strength of 7,000-7,200 psi at 73.4 degrees F., flexural strength of 12,000 psi and compressive strength of 9,000 psi.
 - 4. All joints shall be solvent cemented in accordance with the recommendations of the manufacturer.
- G. Wireways and Auxiliary Gutters
 - 1. Painted steel or galvanized steel.

2. Of sizes and shapes indicated on the Drawings and as required.
3. Provide all necessary elbows, tees, connectors, adapters, etc.
4. Wire retainers not less than twelve (12") inches on center.

H. Aluminum Conduit

1. Do not use aluminum conduit unless specifically indicated on the drawings for special purposes.

2.2. LOCKNUTS AND BUSHINGS

- A. Locknuts shall be steel. Die cast locknuts shall not be used.
- B. All bushings shall be insulated. Use nylon insulated metallic bushings for sizes 1" and larger. Plastic bushings may be used in 1/2" and 3/4" sizes.

2.3. OUTLET BOXES

A. General

1. Recessed wall boxes shall be 2-1/2" deep.
2. Surface-mounted wall boxes shall be 1-1/2" or 2-1/2" deep as required.
3. Lighting Fixture Box
 - a. Four (4") inch octagon with 3/8" fixture stud.
 - b. For suspended ceiling work, four (4") inch octagon with removable backplate where required, and two (2) parallel bars for securing to the cross-furring channels and extend flexible conduit to each fixture.
4. Plug any open knockouts not utilized.

B. Cast Type Conduit Boxes, Outlet Bodies and Fittings

1. Use Ferrous Alloy boxes and conduit bodies with Rigid Steel or IMC.
2. Use Ferrous Alloy or cast aluminum boxes and conduit bodies with Electrical Metallic Tubing.
3. Covers: Cast or sheet metal unless otherwise required.
4. Tapered threads for hubs.

C. Masonry Outlet Boxes

1. Use for all devices recessed in concrete or masonry.
2. Galvanized steel construction.

D. Drawn Steel Boxes

1. Use for all interior exposed devices (where not required or indicated to be cast type).
2. Drawn construction, minimum 0.625" thick galvanized steel.
3. Raised ground connection.
4. Provide with raised, drawn galvanized steel covers.

E. Welded Steel Boxes

1. May be used for recessed devices only, or as a junction box where located above ceiling or on walls where same is located above 6'-0" A.F.F.
2. Minimum 1/16" thick steel construction.

F. Weatherproof Boxes

1. Use for all exterior exposed devices.
2. Cast aluminum construction.
3. Internal hub threads.
4. NEMA 3R listed.

2.4. JUNCTION AND PULL BOXES

- A. Outlet boxes as listed above may be used as junction boxes where provided as a 2-gang box minimum.
- B. Steel Boxes
 - 1. No. 12 USS gauge sheet steel for boxes with maximum side less than forty (40") inches, and maximum area not exceeding 1,000 square inches; riveted or welded 3/4 inch flanges at exterior corners.
 - 2. No. 10 USS gauge sheet steel for boxes with maximum side forty (40") to sixty (60") inches, and maximum area 1,000 to 1,500 square inches; riveted or welded 3/4 inch flanges at exterior corners.
 - 3. No. 10 USS gauge sheet steel riveted or welded to 1-1/2 by 1-1/2" by 1/4" welded angle iron framework for boxes with a maximum side exceeding sixty (60") inches and more than 1,500 square inches in area.
 - 4. Covers
 - a. Same gauge steel as box.
 - b. Subdivided single covers so no section of cover exceeds fifty (50) pounds.
 - c. Machine bolts, machine screws threaded into tapped holes, or sheet metal screws as required; maximum spacing twelve (12") inches.
 - 5. Finish: Galvanized steel or paint with rust inhibiting primer and ANSI No. 61 light gray finish coat.
 - 6. Where size of box is not indicated, size to permit pulling, racking and splicing of cables.
 - 7. For Boxes over 600 Volts
 - a. Provide insulated cable supports and removable steel barriers to isolate each feeder. Stencil cable voltage class in red letters on the front cover of the box.
 - b. Braze a ground connector suitable for copper cables to the inside of the box.

PART 3 - EXECUTION

3.1. APPLICATION OF RACEWAYS

- A. The following applications must be adhered to except as otherwise required by Code. Raceways not conforming to this listing must be removed by the Contractor and replaced with the specified material at the Contractor's expense.
 - 1. Rigid Steel - Application: Where exposed to mechanical injury, where specifically required, exterior exposed locations, and where required by codes and for all circuits in excess of 600 volts.
 - 2. I.M.C. - Application: Same as standard threaded rigid steel conduit.
 - 3. E.M.T. - Applications: Use in every instance except where another material is specified. EMT shall not be used underground or in slab on grade.
 - 4. Flexible Steel - Applications: Use in dry areas for connections to lighting fixtures in hung ceilings, connections to equipment installed in removable panels of hung ceilings at bus duct takeoffs, at all transformer or equipment raceway connections where sound and vibration isolation is required.
 - 5. Liquid-Tight Flexible Conduit - Applications: Use in areas subject to moisture where flexible steel is unacceptable at connections to all motors, and all raised floor areas.
 - 6. Non-Metallic Conduit - Application: Schedule 40 - Where specifically indicated on the drawings and for raceways in slab or below grade. All bends shall be made with steel elbows and wrapped unless the bend is encased in concrete.
 - 7. Wireways and Auxiliary Gutters - Application: Where indicated on the Drawings and as otherwise specifically approved.

3.2. RACEWAY SYSTEMS IN GENERAL

- A. Provide raceways for all wiring systems, including security, data transmission, paging, low voltage et. al. Where non-metallic raceways are utilized, provide sizes as required with the grounding conductor considered as an insulated additional conductor. Wiring of each type and system must be kept independent and installed in separate raceways – including, but not limited to:
1. Wiring of different voltages (480/277V vs. 208/120V)
 2. Emergency / Normal Wiring (except as permitted by NEC 700)
- B. Install capped bushings on raceways as soon as installed and remove only when wires are pulled. Securely tie embedded raceway in place prior to embedment. Lay out the work in advance to avoid excessive concentrations of multiple raceway runs.
- C. Locate raceways so that the strength of structural members is unaffected and they do not conflict with the services of other trades. Install one (1") inch or larger raceways, in or through structural members (beams, slabs, etc.) only when and in the manner accepted by the Architect/Engineer. Draw up couplings and fittings full and tight.
- D. Install no conduits or other raceways sized smaller than permitted in applicable NEC Tables. Where conduit sizes shown on drawings are smaller than permitted by code, Contractor shall include cost for proper size conduit in his base bid. In no case reduce conduit sizes indicated on drawings or specified without written approval of Architect-Engineer. Minimum conduit size shall be 3/4".
- E. Above-grade raceways to comply with the following:
1. Install raceways concealed except at surface cabinets and for motor and equipment connection in electrical and mechanical rooms. Install a minimum of six (6") inches from flues, steam pipes, or other heated lines. Provide flashing and counter-flashing for waterproofing of raceways, outlets, fittings, etc., which penetrate the roof. Route exposed raceways parallel or perpendicular to building lines with right-angle turns and symmetrical bends. Run concealed raceways in a direct line and, where possible, with long sweep bends and offsets. Provide sleeves in forms for new concrete walls, floor slabs, and partitions for passage of raceways. Waterproof sleeved raceways where required.
 2. Raceways shall not be run on roofs or exposed on the outside of the buildings unless specifically noted as exposed on the drawings or approved by the Architect/Engineer.
 3. Provide raceway expansion joints for exposed and concealed raceways with necessary bonding conductor at building expansion joints and between buildings or structures and where required to compensate for raceway or building thermal expansion and contraction. Provide expansion fittings every 200 feet on outdoor conduit.
 4. Provide one (1) empty 3/4 inch raceway for each three (3) spare unused poles or spaces of each flush-mounted panelboard. Terminate empty 3/4 inch conduit in a junction box, which after completion, is accessible to facilitate future branch circuit extension.
 5. Provide raceway installation (with appropriate seal-offs, explosion-proof fittings, etc.) in special occupancy area, as required. Provide conduit seal-offs where portions of an interior raceway system pass through walls, ceiling, or floors which separate adjacent rooms having substantially different maintained temperatures, as in refrigeration or cold storage rooms.
 6. Provide pull string in spare or empty raceways. Allow five (5) feet of slack at each end and in each pull box. Tie each end of the string to a washer or equivalent that does not fit into the conduit. Tag both ends of string denoting opposite end termination location.
- F. Below Grade
1. Below grade raceways to comply to the following:
 - a. Do not penetrate waterproof membranes unless proper seal is provided.
 2. Protect steel raceway in earth or fill with two (2) coats of asphalt base paint. Touch up abrasions and wrench marks after conduit is in place.
 3. In lieu of the above, protect steel raceways with a minimum of ten (10) mil tape approved for

the purpose and overlapped a minimum of one-half tape width to provide a minimum twenty (20) mil thickness.

- G. No raceway may be installed in a concrete slab or members except with the permission of the Structural Engineer and with the written consent of the Owner.
1. Conduits embedded in structural concrete slabs shall have an outside diameter less than one third of the thickness of the concrete slab and shall be installed entirely within the center one third of the concrete slab.
 2. Raceways embedded in concrete slabs shall be spaced not less than eight (8") inches on centers and as widely spaced as possible where they converge at panels or junction boxes.
 3. In no case will installation of raceways be permitted to interfere with the proper placement of principal reinforcement.
 4. Raceways running parallel to slab supports, such as beams, columns, and structural walls, shall be installed not less than twelve (12") inches from such supporting elements.
 5. To prevent displacement during concrete pour of lift slab, saddle supports for conduit, outlet boxes, junction boxes, inserts, etc., shall be secured with suitable adhesives.
- H. Non-metallic raceway installation shall conform to the following:
1. All joints are to be made by the solvent cementing method using the material recommended by the raceway manufacturer. To insure good joints, components shall be cleaned prior to assembly.
 2. Raceway cut-offs shall be square and made by handsaw or other approved means which does not deform the conduit. Raceway shall be reamed prior to solvent cementing to couplings, adapters, or fittings.
 3. Electrical devices which are served by PVC raceways shall be grounded by means of a ground wire pulled in the raceway.
 4. Bends shall be made by methods that do not deform or damage the conduit. The radii of field bends shall not be less than those established by the N.E.C.
 5. Raceway expansion fittings shall be provided where necessary. The position of the expansion fitting shall be adjusted proportional to the temperature at installation.
 6. Raceway supports shall be installed, in such a manner, to allow the PVC conduit to slide through the supports as the temperature changes.
 7. Elbows must be galvanized rigid steel, intermediate metallic conduit or concrete encased. Plastic conduit may only be used for exterior underground applications or circuits beneath slabs on grade. Provide galvanized rigid steel (GRS) radius bends and risers as conduits rise above grade or above floor slab.
 8. Provide exterior underground conduit with metal detection strip.
 9. Provide matching plastic fittings. Fittings shall meet the same standards and specifications as the conduit on which it is installed.
 10. Joining and bending of conduit and installation of fittings shall be done only by methods recommended.
 11. Provide conduit support spacing as recommended for the highest ambient temperature expected.
 12. Provide interlocking conduit spacers for multiple runs of underground conduits installed in same trench.
 13. Provide expansion couplings on long runs regardless of ambient temperatures. Determine amount of conduit expansion and contraction from published charts or tables.
 14. Test workmanship by conducting a low-pressure air (3.0-5.0 psi) test after system is installed and cemented joints are set. Plug and block ends to prevent movement prior to pressurization. Check for leaks at all joints with a soap solution. Even low-pressure air can cause high thrust loads and caution must be observed. The test shall be observed by the architect, engineer or owner's representative, prior to backfill. All below grade conduit that could potentially drain water into electrical equipment (ie. Main electrical service located in

basement below utility transformer) must be watertight.

- I. Raceways in hung ceiling shall be run on and secured to slab or primary structural members of ceiling, not to lathing channels or T-bars, Z-bars, or other elements which are the direct supports of the ceiling panels. Secure conduit firmly to steel by clips and fittings designed for that purpose. Install as high as possible, but not less than 1'-0" above hung ceilings.
- J. Exposed raceways shall be run parallel or at right angles with building lines.
- K. Clear raceway of all obstructions and dirt prior to pulling in wires or cables. This shall be done with ball mandrel (diameter approximately 85% of conduit inside diameter) followed by close fitting wire brush and wad of felt, or similar material. This assembly may be pulled in together with, but ahead of, the cable being installed. All empty raceways shall be similarly cleaned. Clear any raceway which rejects ball mandrel.

3.3. OUTLET BOXES

- A. Fit outlet boxes in finished ceilings or walls with appropriate covers, set flush with the finished surface. Where more than one switch or device is located at one point, use gang boxes and covers unless otherwise indicated. Sectional switch boxes or utility boxes will not be permitted. Provide Series "GW" (Steel City) tile box, or as accepted, or a four (4") inch square box with tile ring in masonry walls, which will not be plastered or furred. Where drywall material is utilized, provide plaster ring.
 - 1. Provide outlet boxes of the type and size suitable for the specific application.
 - 2. Where outlet boxes contain two (2) or more 277 volt devices, or where devices occur of different applied voltages, or where normal and emergency devices occur in same box, provide suitable barrier.
 - 3. Install all wall mounted switch and receptacle boxes with bracing between two adjacent studs where rigid conduit is not used for circuiting. Box and receptacle shall not deflect on operation or insertion of plugs.
- B. Install boxes and covers for wiring devices so that the wiring devices will be installed with a vertical orientation unless otherwise noted on the drawings.
- C. The exact location of outlets and equipment is governed by structural conditions and obstructions, or other equipment items. When necessary, relocate outlets so that when fixtures or equipment are installed, they will be symmetrically located according to the room layout and will not interfere with other work or equipment. Verify final location of outlets, panels equipment, etc., with Architect.
- D. Back-to-back outlets in the same wall, or "thru-wall" type boxes not permitted. Provide twelve (12") inch (minimum) spacing for outlets shown on opposite sides of a common wall to minimize sound transmission.
- E. Provide twenty four (24") inch (minimum) horizontal spacing for outlets shown on opposite sides of a fire rated wall.
 - 1. Provide listed fire putty pads around the each box to maintain fire rating, where aggregate area of boxes in wall exceeds maximum per code.
- F. Install top of switch outlet boxes 48" above floor unless otherwise called for or required by wainscot, counter, etc. Install bottom of receptacle outlet boxes 16" above floor unless otherwise called for on drawings.
 - 1. Adjust mounting heights to nearest masonry joint for minimum cutting in case of flush outlets.

3.4. JUNCTION AND PULL BOXES

- A. Provide junction and pull boxes as indicated on the drawings and as required for the complete installation of the various electrical systems, and to facilitate proper pulling of wires and cables.
 - 1. J-boxes and pull boxes shall be sized per electrical code minimum.
 - 2. Boxes on empty conduit systems shall be sized as if containing conductors of #4 AWG.
 - 3. Wiring systems required to have separate/independent raceways (See Section 3.2 above) shall

also be provided with separate junction and pull boxes. These wiring systems may occupy the same outlet box only if a divider is installed between the wiring that is listed for this purpose.

B. Pull Box Spacing

1. Provide pull boxes so no individual conduit run contains more than the equivalent of four (4) quarter bends (360 degrees total).
2. Conduit Sizes 1-1/4" and Larger.
 - a. Provide boxes to prevent cable or wire from being excessively twisted, stretched, or flexed during installation.
 - b. Provide boxes for medium voltage cables so that maximum pulling tensions do not exceed cable manufacturer's recommendations.
 - c. Provide support racks for boxes with multiple sets of conductors do not rest on any metal work inside box.
3. Conduit Sizes one (1") inch and smaller, low voltage wire and cable (maximum distances)
 - a. 200 feet straight runs.
 - b. 150 feet runs with one 90 degree bend or equivalent.
 - c. 125 feet runs with two 90 degree bends or equivalent.
 - d. 100 feet runs with three or four 90 degree bends or equivalent.

END OF SECTION 260533

SECTION 260553 – ELECTRICAL IDENTIFICATION**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 260010.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. DESCRIPTION OF WORK

- A. A. Provide identification on all equipment, raceways, boxes and conductors.

PART 2 - PRODUCTS**2.1. NAMEPLATES**

- A. Nameplates shall be lamacoid plates with engraved upper-case letters and beveled edges.
 - 1. Stamped or embossed metal tags are not considered acceptable for this purpose.
- B. Color:
 - 1. Normal-power equipment shall have white nameplates with black letters, enclosed by a black border.
 - 2. Equipment fed from the emergency electrical system, or otherwise designated on the plans for emergency use, shall have red nameplates with white letters, enclosed by a white border.
 - 3. Nameplates for short circuit ratings and calculations shall be yellow with black letters, enclosed by black border.
- C. All nameplates shall be engraved and must be secured with rivets, brass or cadmium plate screws. The use of Dymo tape or the like is unacceptable.
- D. Nameplate inscriptions shall bear the name and number of equipment to which they are attached as indicated on the Drawings. The engineer reserves the right to make modifications in the inscriptions as necessary.
 - 1. Inscription letters shall be 1/2" in size.

2.2. CABLE TAGS AND WIRE IDENTIFICATION LABELS

- A. Cable tags shall be flameproof secured with nylon ties.
- B. Wire markers shall be preprinted cloth tape type or approved equivalent.

2.3. IDENTIFICATION LABELS

- A. Acceptable Manufacturers
 - 1. W.H. Brady Company (Style A)
 - 2. Thomas & Betts Company (T&B), Style A.
 - 3. Seaton
- B. Plasticized Cloth
 - 1. Non-conductive.
 - 2. Waterproof.
 - 3. Capable of withstanding continuous temperatures of 235 degrees F and intermittent temperatures to 300 degrees F.
 - 4. Overcoating for protection against oil, solvents, chemicals, moisture, abrasion and dirt.
- C. Heavy, thermo-resistant industrial grade adhesive, for adhesion of label to any surface without curling, peeling or falling off.

- D. Label Designations, Nominal System Voltages Applied to the covers of all medium and low voltage pull, splice and junction boxes.
- E. Machine printed.
 - 1. Letters shall be 3/8" in size.

PART 3 - EXECUTION

3.1. INSTALLATION

A. Service Entrance Equipment

1. Where electrical equipment (switchboard, panelboard, disconnect switch, etc.) is installed as service entrance equipment, contractor shall furnish and install a nameplate listing the following:
 - a. Equipment Short-Circuit Current Rating in amperes (RMS SYM), as indicated on the drawings.
 - b. Whether or not the equipment is fully or series-rated.
 - c. Available Fault Current in amperes. Contractor shall perform available fault current calculation (as outlined in Section 260011) to obtain available fault at Service Equipment.
 - d. Date fault current calculations were performed.
 - i. Example:

EQUIPMENT FULLY-RATED AT 65,000 AMPERES RMS SYM AVAILABLE FAULT CURRENT: 45,203 AMPERES DATE CALCULATED: 2/24/2022
--

B. Switchboards/ Distribution Panelboards.

1. Furnish and install a nameplate for each switchboard or distribution panelboard. Nameplate shall be engraved with the following information:
 - a. Top Line: Equipment identification as indicated on the Drawings.
 - b. Middle Line: Specific device or equipment where feeder originates.
 - c. Bottom Line: Equipment voltage, size, and phase as indicated on the drawings.
 - d. Example:

SWITCHBOARD SWDP1 FED FROM UTILITY COMPANY TRANSFORMER 208/120V, 1200A, 3-PHASE

2. Nameplate shall be mounted at the top of the incoming section.
3. Each switch / circuit breaker shall be provided with an identifying nameplate.
 - a. Main devices shall be identified as such. Where multiple mains are employed each switch shall be numbered. Inscription shall be "MAIN SWITCH" or "MAIN SWITCH NO. 1" et al.
 - b. Branch/feeder devices shall be identified with either the load served or a number corresponding to the furnished circuit directory.

C. Panelboards and Load Centers.

1. Furnish and install a nameplate for each panelboard and load center. Nameplate shall be engraved with the following information:
 - a. Top Line: Equipment identification as indicated on the Drawings.
 - b. Middle Line: Specific device or equipment where feeder originates.

c. Bottom Line: Equipment voltage, size, and phase as indicated on the drawings.

d. Example:

PANELBOARD LN1 FED FROM SWITCHBOARD SWDP1 IN ROOM #332 208/120V, 200A, 3-PHASE
--

2. Nameplate shall be mounted at the top of the panel.
3. After installations are complete, provide and mount under sturdy transparent shield in the directory frame of each panel door, a neat, accurate, and carefully typed directory properly identifying the lighting, receptacles, outlets, and equipment each overcurrent device controls.
 - a. Include on directory the panel or load center identification, the cable and raceway size of panel feeder, and the feeder origination point.

D. Disconnect Switches.

1. Furnish and install a nameplate for each disconnect switch engraved with the equipment designation which the disconnect serves and the panel and circuit the switch is fed from.

E. Disconnect Switches.

1. Furnish and install a nameplate for each disconnect switch engraved with the equipment designation which the disconnect serves.

a. Example:

AHU – 1 FED FROM PANEL LP-1 – 32

2. Nameplate shall be mounted at the top of the disconnect.

F. Motor Controllers.

1. Furnish and install a nameplate for each motor controller or combination motor controller for both individual motor controllers and those in a motor control center. Engraving must indicate the motor served and the type of service (e.g., AC-8-1st floor supply, EF-2 electric closet exhaust.)

G. Feeder Switches.

1. Furnish and install for each feeder switch including, but not limited to those in switchboards, switch and fuse panelboards, take-offs at bus ducts, motor control centers, multiple meter centers, etc., two (2) nameplates as follows:
 - a. The first nameplate must be white background with red lettering. Engrave with the words "REPLACE ONLY WITH _____ FUSE." Engrave with proper fuse trade name and ampere rating (i.e. Bussman LPS-R 100).
 - b. The second nameplate shall indicate the load served, the size and type of cable and raceway example:
 - i. LP-4, LP-5, LP-6
 - ii. 4#500 KCMILS-THW-CU-3-1/2"C

H. Remote Smoke Detector Lamps and Test Stations.

1. Furnish and install a nameplate on each remote smoke detector lamp and/or test station.
2. Engraving must indicate the location of the device to which the lamp is connected, as approved by the Engineer.

I. Switches.

1. Furnish and install an engraved nameplate for each switch, controlling loads that are not local to the switch. Engraving shall be as directed by the Engineer.
- J. Receptacles.
1. Furnish and install a clear typed label on each faceplate for each receptacle indicating panel and circuit.
 - a. Example:

LP-1/32
 2. Label shall be mounted at the top of the faceplate.
- K. Pullboxes, Enclosures, and Cable Terminations.
1. Circuits rated over 40 Amp and all cables over 600V:
 - a. Provide identification label with circuit numbers on enclosure cover.
 - b. Furnish and install cable tags on each cable that enters a pullbox, enclosure, switchboard, and at terminations. Mark tags with type written inscription noting the load served, type and size of cable, and the overcurrent device protecting the cable.
- L. Branch circuits:
1. Provide identification label with panel and circuit numbers on enclosure cover.
 2. Identify each circuit with wire markers when enclosure label and wire colors do not provide enough information to identify each circuit without tracing.
 3. Provide feeders and branch circuit home runs with plasticized wire marker indicating circuit number and power source. Provide feeders phase identification letter at each terminal point in addition to its circuit number.
 4. 4 square box covers hidden above lay-in ceilings may be marked with indelible ink marker in lieu of using printed labels.
- M. Fire Alarm Terminal Cabinets.
1. Furnish and install an approved nameplate on each fire alarm terminal cabinet.
 2. Nameplates shall indicate floor and where multiple terminal cabinets are installed a prime designation for each cabinet (e.g. FATC-1A, FATC-1B).
 3. Terminals shall be permanently identified in an approved manner.
 4. Label all wiring.
- N. Telecommunications System.
1. Each horizontal cable from a termination block or patch panel to a telecommunications outlet shall be labeled at both ends. Tags shall be consecutively numbered so that no two (2) cables have the same identification. In addition cable tag shall note the room number in which the data transmission outlet is located.
 2. Each backbone cable shall have a flameproof tag attached at both ends of the tag. Tags shall be consecutively numbered so that no two (2) cables have the same identification. Additional inscriptions shall be provided as directed by the Owner.
 3. Patch panel ports shall be consecutively numbered so that no two (2) ports have the same number.
 4. Furnish and install a clear typed label on each faceplate for each outlet and jack indicating cable per ANSI/TIA/EIA/606A standards and project nomenclature. Label materials and finish shall match style, font, color, etc as any adjacent receptacles.
 5. Label shall be mounted at the top of the faceplate.
- O. Warning Signs
1. Provide electrical equipment and accessible wiring enclosures operating at voltage above 240

volts with self-sticking polyester sign with wording and size conforming to ANSI Standard Z35.1-1964 and OSHA 19.0.144iii(2) Specifications “Danger High Voltage” warning sign and voltage marker applied to front door or cover of device or enclosure.

2. Provide large equipment such as transformers and main distribution equipment with self-sticking polyester sign with wording and size conforming to ANSI Standard Z35.1-1964 and OSHA 19.0.144iii(2) Specifications indicating all electrical characteristics.

P. Boxes

1. Provide identification labels for all low voltage and medium voltage pull, splice and junction boxes in main feeder and subfeeder runs, indicating nominal system voltage.
2. Apply labels after painting of boxes, conduits, and surrounding areas have been completed.
3. Clean surfaces before applying labels; clean aluminum surfaces with solvent wipe.
4. Apply labels on cover and minimum of one (1) fixed side; one (1) label visible from floor where boxes are installed exposed.

END OF SECTION 260553

SECTION 260923 – LIGHTING CONTROL DEVICES**PART 1 GENERAL****1.1. SUMMARY**

- A. This Section includes the following lighting control devices:
 - 1. Time switches.
 - 2. Outdoor photoelectric switches.
 - 3. Indoor occupancy sensors.
 - 4. Lighting contactors.
 - 5. Emergency shunt relay.

1.2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.
- C. Operation and maintenance data.

1.3. QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 PRODUCTS**2.1. TIME SWITCHES**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. GE
 - 2. Intermatic, Inc.
 - 3. Leviton.
 - 4. Lithonia Lighting.
 - 5. Paragon Electric Co.
 - 6. Square D.
 - 7. TORK.
 - 8. Watt Stopper.
- B. Electronic Time Switches: Electronic, solid-state programmable units with alphanumeric display; complying with UL 917.
 - 1. Contact Configuration: SPST.
 - 2. Contact Rating: 30-A inductive or resistive, 240-V ac.
 - 3. Retain one of first three subparagraphs below.
 - 4. Program: 8 on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
 - 5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.
 - 6. Astronomic Time: All channels.
 - 7. Battery Backup: For schedules and time clock.
- C. Electromechanical-Dial Time Switches: Type complying with UL 917.
 - 1. Contact Configuration: SPST.
 - 2. Contact Rating: 30-A inductive or resistive, 240-V ac.
 - 3. Five subparagraphs below describe optional features.
 - 4. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.

5. Astronomic dial in first subparagraph below makes the time switch self-adjusting for seasonal changes and automatically adjusts on-off times as days grow shorter or longer.
6. Astronomic time dial.
7. Eight-Day Program: Uniquely programmable for each weekday and holidays.
8. Skip-a-day mode.
9. Wound-spring reserve carryover mechanism to keep time during power failures, minimum of 16 hours.

2.2. OUTDOOR PHOTOELECTRIC SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. GE
 2. Intermatic, Inc.
 3. Leviton.
 4. Lithonia Lighting.
 5. Paragon Electric Co.
 6. Square D.
 7. TORK.
 8. Watt Stopper.
- B. Description: Solid state, with DPST dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.
 1. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of photocell to prevent fixed light sources from causing turn-off.
 2. Time Delay: 15-second minimum, to prevent false operation.
 3. Surge Protection: Metal-oxide varistor, complying with IEEE C62.41.1, IEEE C62.41.2, and IEEE 62.45 for Category A1 locations.
 4. Mounting: Twist lock complying with IEEE C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.

2.3. INDOOR OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Cooper (Greengate)
 2. Hubbell Lighting.
 3. Leviton Mfg. Company Inc.
 4. Philips Controls
 5. Sensor Switch, Inc.
 6. Steinel
 7. Watt Stopper.
- B. General Description: Wall- or ceiling-mounting, solid-state units with a separate relay unit.
 1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 3. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
 4. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.

- b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
 6. Bypass Switch: Override the on function in case of sensor failure.
 7. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; keep lighting off when selected lighting level is present.
- C. PIR Type: Ceiling mounting; detect occupancy by sensing a combination of heat and movement in area of coverage.
1. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in..
 2. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.
 3. Detection Coverage (Corridor): Detect occupancy within 90 feet when mounted on a 10-foot-high ceiling.

2.4. EMERGENCY SHUNT RELAY

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Lighting Control and Design, Inc.
- B. Description: Normally closed, electrically held relay, arranged for wiring in parallel with manual or automatic switching contacts; complying with UL 924.
1. Coil Rating: 120 or 277 V as required.

PART 3 EXECUTION

3.1. SENSOR INSTALLATION

- A. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.
- B. When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

3.2. CONTACTOR INSTALLATION

- A. Mount electrically held lighting contactors with elastomeric isolator pads, to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.3. IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26 Section "Identification for Electrical Systems."
 1. Identify controlled circuits in lighting contactors.
 2. Identify circuits or luminaries controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

3.4. FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:

1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
 2. Operational Test: Verify operation of each lighting control device, and adjust time delays.
- B. Lighting control devices that fail tests and inspections are defective work.

END OF SECTION 260923

SECTION 262416 – PANELBOARDS

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

- A. Reference Section 260010.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 - 5. Include evidence of NRTL listing for series rating of installed devices.
 - 6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 7. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.
- C. Field quality-control reports.
- D. Operation and maintenance data.

1.3. QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.

1.4. WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1. GENERAL

- A. Provide panelboards as indicated in the panelboard schedule and where shown on the plans. Panelboards shall be equipped with fusible switches or thermal-magnetic, molded case circuit breakers as indicated on the schedules.

2.2. MANUFACTURERS

- A. Equivalentents by Eaton (Cutler-Hammer), Square D, GE, or ITE Siemens.
 - 1. Equivalent Panelboards to those specified on the plans shall be considered as follows:

Cutler Hammer	Square D	GE	Siemens
Pow-R-Line 1A	NQOD	AQ	P1
Pow-R-Line 2A	NQOD	AE	P2
Pow-R-Line 3A	NF* / I-Line	AE* / Spectra	P3

Pow-R-Line 4B	I-Line	Spectra	P4
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* Submitted equipment must be able to accommodate ALL breakers shown in panelboard schedules as branch-mounted devices. If unable to do so, provide distribution panelboard as noted.

2.3. PANELBOARDS

A. Busing Assembly and Temperature Rise:

1. Panelboard bus structure and main lugs or main breaker shall have current ratings as shown on the panelboard schedule. Such ratings shall be established by heat rise tests with maximum hot spot temperature on any connector or bus bar not to exceed 50 degrees C rise above ambient. Heat rise tests shall be conducted in accordance with Underwriters Laboratories Standard UL 67.
2. Provide tin-finished copper bars full length of panel with rating listed in schedule. Bus bar connection to branch circuit breakers shall be "Phase Sequence" type designed and assembled so circuit breakers can be replaced without disturbing adjacent breakers or removing main bus or branch circuit connectors. Provide bus bars with wire lugs suitable for copper or aluminum conductors. Provide each panel with equipment tin finished copper grounding bus grounded to box and tin finished copper neutral bus insulated from box.

B. Integrated Equipment Short Circuit Rating

1. Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the integrated equipment rating as indicated in the schedules. This rating shall be established by testing with the overcurrent devices mounted in the panelboard. The short circuit tests on the overcurrent devices and on the panelboard structure shall be made simultaneously by connecting the fault to each overcurrent device with the panelboard connected to its rated voltage source. Method of testing shall be per Underwriters Laboratories Standard UL 67. The source shall be capable of supplying the specified panelboard short circuit current or greater. Panelboards shall be marked with their maximum short circuit current rating at the supply voltage and shall be UL listed.

C. Cabinet

1. Panelboard assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. The size of wiring gutters shall be in accordance with UL Standard 67. Provide branch circuit panelboard cabinets with latch and tumbler-type lock on door of trim. Doors over 48" long shall be equipped with three-point latch and vault lock. All locks shall be keyed alike. Endwalls shall be removable. Fronts shall be of code gauge steel. Gray baked enamel finish electrodeposited over cleaned phosphatized steel. Fusible panelboards and large distribution circuit breaker panelboards shall not be provided with doors.

D. Safety Barriers

- a. The panelboard interior assembly shall be dead front type with panelboard front removed. Main lugs or main breakers shall have barriers on five sides. The barrier in front of the main lugs shall be hinged to a fixed part of the interior. The end of the bus structure opposite the mains shall have barriers.

E. UL Listing

- a. Panelboards shall be listed by Underwriters Laboratories and shall bear the UL label. When required, panelboards shall be suitable for use as service equipment.

2.4. OVERCURRENT PROTECTIVE DEVICES

A. Branch Circuit Breakers

1. Branch circuit breakers shall be quick-make, quick-break with trip indication. Circuit breakers shall operate both manually for normal switch functions and automatically under overload and short circuit conditions. They shall provide circuit and self-protection when applied within their rating. Operating mechanisms shall be entirely trip free so that contacts cannot be held closed against a short circuit. Operating handle of circuit breaker shall open and close all poles of a multipole breaker simultaneously. Conforming to NEMA Standards Publications No. AB1-1964 and be approved by UL. Circuit breaker shall have a thermal magnetic trip unit for each pole for inverse time delayed overload protection and an instantaneous magnetic element for short circuit protection. Multiple pole trip elements shall operate a common internally connected trip bar to open all poles in case of overload or short circuit through any one pole.
2. Provide arc-fault protection circuit breakers for all sleeping rooms and other areas required by code.

B. Fusible Switches

1. The fusible switches shall be horsepower rated, quick-make, quick-break and shall be mounted in panel-type construction. Switches shall have plug-on side connections and shall have built in fuse pullers. Each switch is to be contained in a separate steel enclosure. The enclosure will employ a hinged cover for access to the fuses which will be interlocked with the operating handle to prevent opening the cover when the switch is in the “on” position. This interlock shall be constructed so that it can be released with a standard electrician’s tool for testing fuses without interrupting service. The units shall have padlocking provisions in the “off” position, i.e., red for “on” and black for “off”. Fusible switch units shall be interchangeable without disturbing adjacent units and be properly supported to prevent vibration and breakage during shipment and handling.
2. Fuse holders shall be high-pressure type for use with Class R fuses. Main switch fuse holder shall be set up for use with UL Class R fuses. Provide rejection clips for fuse holders where rejection type fuses are called for or shown.

PART 3 EXECUTION

3.1. EXAMINATION

- A. Examine panelboards before installation. Reject panelboards that are moisture damaged or physically damaged.
- B. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. INSTALLATION

- A. Store, handle, and install panelboards and accessories per manufacturer’s recommendations.
- B. Secure the assembly in place.
- C. Provide 3½” housekeeping pad where two or more conduits penetrate floor or when equipment is floor/ground mounted.
 1. Provide one (1) empty 3/4 inch raceway for each three (3) spare unused poles or spaces of each panelboard. Terminate empty 3/4 inch conduit in a junction box, which after completion, is accessible to facilitate future branch circuit extension. Cap and mark below grade spare conduits.
- D. Wall-mounted equipment:
 1. Mount bottom of trim a minimum of 24” above finish floor. Maintain accessibility to overcurrent devices per NEC. Where both conditions cannot be met, consult with engineer on mounting height of equipment.
 2. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

3. Where flushed mounted, the fire integrity of the wall in which it is installed must be maintained.
 4. Where flush mounted provide (2)2” conduits from the can to above an accessible ceiling and terminate with a minimum 8”x8” junction box located in a concealed manner.
- E. Neatly arrange branch circuit wires and tie together in each gutter with Thomas & Betts nylon "Ty-Raps", or approved equal at minimum 4 inch intervals.
 - F. Plug all knockouts removed and not utilized.
 - G. Install overcurrent protective devices and controllers not already factory installed.
 - H. Install filler plates in unused spaces.

3.3. IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- B. Panelboard Nameplates: Label each panelboard compartment with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- C. Device Nameplates: Label each disconnecting and overcurrent protective device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- D. For panelboards (and distribution panelboards where labeling of individual breakers is not possible or practical), provide a typed circuit directory for same as follows:
 1. Panels shall have branch circuit directory holders with clear plastic cover.
 2. Provide neatly typed list of branch circuit loads corresponding to branch circuit numbers. Handwritten directories are not acceptable.
 3. For remodel work or changes, trace circuits to determine loads and provide new updated directory.

3.4. FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Acceptance Testing Preparation:
 1. Test insulation resistance for each panelboard bus, component, connecting supply, and feeder.
 2. Test continuity of each circuit.
- C. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5. ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as indicated in the coordination study.

3.6. LOAD BALANCE

- A. 30 days after occupancy provide record ampacity loads for each panelboard by phase.
- B. Adjust circuit and phase loading so that each phase is within 25% of other phases if possible.
- C. Update circuit directory with new typewritten directory with any circuit changes for balance of loads.
- D. Update any labels on equipment, receptacles etc to any circuit changes due to balancing.

3.7. TOUCH UP AND CLEANING

- A. Vacuum all backboxes clean of debris after installation and prior to contract closeout.
- B. Touch up scratch marks, etc. with matching paint.

3.8. OBSERVATIONS

- A. All panel fronts shall be removed by the Contractor for observation of the panel interiors by the Engineers.
- B. Panel fronts shall be removed when directed by the Engineer/Architect for observation and reinstalled immediately after the observations.

END OF SECTION 262416

SECTION 262726 – WIRING DEVICES**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 260010.
- B. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.3. QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 PRODUCTS**2.1. GENERAL****A. Manufacturers**

- 1. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - a. Eaton Wiring Devices; (may be listed below and/or submitted as Eaton, Cooper, Arrow Hart, or Crouse-Hinds).
 - b. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - c. Leviton Mfg. Company Inc. (Leviton).
 - d. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).
- 2. All devices shall be from the same manufacturer.

B. Finishes

- 1. Color: Wiring device catalog numbers in Section Text do not designate device color.
 - a. Wiring Devices Connected to Normal Power System: Gray, unless otherwise indicated or required by NFPA 70 or device listing.
 - i. Color shall be coordinated and verified with Architect and owner.
 - b. Wiring Devices Connected to Emergency Power System: Red.
 - c. Isolated Ground Devices: Orange.
 - d. TVSS Devices: Blue.
 - e. Controlled Devices: Green.

2.2. STRAIGHT BLADE RECEPTACLES**A. General Requirements for Convenience Receptacles**

- 1. Unless otherwise modified below, all receptacles shall comply with the following:
- 2. Commercial / Common Areas: 125 V, 20 A
- 3. Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
- 4. Multiple types of receptacles may be required of a single device (Ex.: a Hospital-Grade GFCI

receptacle), as indicated on the plans and in the execution section below. Where such a device is required, it shall meet the requirements of all applicable sections below.

5. Products: Subject to compliance with requirements, provide one of the following:
 - a. Refer to list of approved manufacturers in general section.
 - b. Receptacle model/series(all manufacturers): 5361 (single), 5362 (duplex).

B. Controlled Receptacles

1. Controlled outlet(s) shall be marked with a “power symbol” in accordance with NEC 406.3.
2. Receptacles shall be split-wired (half controlled, half ‘hot’).
3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; 5362CH.
 - b. Hubbell; BR20C1.
 - c. Leviton; 5362-S1.
 - d. Pass & Seymour; 5362CH.

C. GFCI Receptacles

1. Straight blade, feed or non-feed-through type.
2. Include indicator light that is lighted when device is tripped.
3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; SGF20.
 - b. Hubbell; GFRST20.
 - c. Leviton; G5362.
 - d. Pass & Seymour; 2097.
4. Where devices are shown labeled as GFI on drawings provide GFCI receptacle (feed-through devices are not acceptable unless otherwise noted, or with written permission from the engineer).
 - a. Devices labeled as GFIP on the drawings may be protected as a feed-through device.

D. Weather-Resistant Receptacles

1. Receptacles shall UL-listed as weather-resistant.
2. Receptacles shall be identified with an “WR” on the receptacle face.
3. Products: Refer to General Requirements for Convenience Receptacles. WR receptacles shall be of same series.

E. Isolated Ground Receptacles

1. IG receptacles shall be 3 wire grounding type NEMA No. 5-20R-IG.
2. Receptacle shall be constructed with Nylon face and base; .050 gauge brass nickel-plated backstrap with isolated ground design; riveted self-grounding clip; and .040 gauge solid brass, nickel-plated, triple-wipe contacts.
3. Products: Refer to General Requirements for Convenience Receptacles. IG receptacles shall be of same series.

F. Surge Suppression Receptacles

1. Surge Suppression receptacles shall be isolated ground, duplex receptacle design, and shall contain surge suppression device to protect appliances served by the receptacle.
2. Receptacles shall provide 13,000 Amps Maximum Surge Current Line to Neutral; 6,500 ampere Maximum Surge Current Line to Ground; and 6,500 ampere Max. Surge Current Neutral to Ground; each based on IEEE C62.41, * X 20 us waveform.
3. Receptacle shall be certified by UL 1449 to have maximum clamping voltage of 500 Volts Peak Line to Neutral, Line to Ground, and Neutral to Ground based on Class B, 6KV, 3KA impulse, and shall be suitable for ANSI/IEEE C62.41-1980 installation categories A and B.

4. Receptacle shall have an audible alarm.

G. Tamper-Resistant Receptacles

1. Tamper-Resistant Receptacles shall be safety type, “childproof,” duplex, 3 wire, ground type.
2. Products: Refer to General Requirements for Convenience Receptacles. TR receptacles shall be of same series.

2.3. SNAP SWITCHES

A. Comply with NEMA WD 1 and UL 20.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Catalog numbers in subparagraphs below are for 20-A devices; revise catalog numbers if 15-A devices are desired.
 - b. Cooper; 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).
 - c. Hubbell; CS1221 (single pole), CS1222 (two pole), CS1223 (three way), CS1224 (four way).
 - d. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
 - e. Pass & Seymour; 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).

C. Pilot Light Switches, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; 2221PL for 120 V and 277 V.
 - b. Hubbell; HPL1221PL for 120 V and 277 V.
 - c. Leviton; 1221-PLR for 120 V, 1221-7PLR for 277 V.
 - d. Pass & Seymour; PS20AC1-PLR for 120 V.
2. Description: Single pole, with neon-lighted handle, illuminated when switch is "ON."

D. Key-Operated Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; 2221L.
 - b. Hubbell; HBL1221L.
 - c. Leviton; 1221-2L.
 - d. Pass & Seymour; PS20AC1-L.
2. Description: Single pole, with factory-supplied key in lieu of switch handle.

2.4. OCCUPANCY SENSORS

A. Wall-Switch Sensors:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; 6111 for 120 V, 6117 for 277 V.
 - b. Hubbell; WS1277.
 - c. Leviton; ODS 10-ID.
 - d. Pass & Seymour; WS3000.
 - e. Steinel; IL WLS 1.
 - f. Watt Stopper (The); PW-101.
2. Description: Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 180-degree field of view, with a minimum coverage area of 900 sq. ft..

B. Long-Range Wall-Switch Sensors:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hubbell; ATP1600WRP.
 - b. Leviton; ODWWV-IRW.
 - c. Pass & Seymour; WA1001.
 - d. Steinel; IL WLS 1
 - e. Watt Stopper (The); CX-100.
2. Description: Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 110-degree field of view, with a minimum coverage area of 1200 sq. ft..

2.5. SPECIAL PURPOSE DEVICES

- A. Provide where indicated, specified or as required other appropriate NEMA configured devices appropriate for such equipment as thru-wall units manufactured by the same manufactures.

2.6. WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
 1. Plate-Securing Screws: Metal with head color to match plate finish.
 2. Material for Finished Spaces: 0.035-inch-thick, satin-finished stainless steel.
 3. Material for Unfinished Spaces: Galvanized steel.
 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum with lockable in-use cover.
- C. Damp-Location, Damp Location Cover Plates: NEMA 250, spring loaded and gasketed, die-cast aluminum.
- D. Emergency Devices
 1. Coverplates for devices fed from emergency power shall be denoted as such with a device plate engraved with the word "EMERGENCY" in red capital letters.

2.7. FLOOR SERVICE FITTINGS

- A. Type: Modular, flush-type, dual-service units suitable for wiring method used.
- B. Compartments: Barrier separates power from voice and data communication cabling.
- C. Service Plate: solid brass with satin finish.
- D. Power Receptacle: NEMA WD 6 configuration 5-20R, gray finish, unless otherwise indicated.
- E. Voice and Data Communication Outlet: Two modular, keyed, color-coded, RJ-45 Category 5e jacks for UTP cable.

PART 3 EXECUTION**3.1. INSTALLATION**

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailing existing conductors is permitted provided the outlet box is large enough.

D. Receptacle Types:

1. The following receptacle types shall be furnished in lieu of “standard” 120V, 15 or 20 amp receptacles at all of the following locations, regardless of plan designation:
 - a. Refer to the National Electrical Code (NEC), for definitions of all locations listed below.
2. GFCI Receptacles:
 - a. Bathrooms / Locker Rooms
 - b. Kitchens (unless circuit is provided with GFCI protection at the circuit breaker)
 - c. Rooftops
 - d. Outdoors
 - e. Where located within 6’-0” of a sink.
 - f. Garages, Service Bays, etc.
 - g. Unfinished areas.
3. Weather-Resistant Receptacles:
 - a. In all damp or wet locations.

E. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.
10. Wall plates shall not support wiring devices. Provide wiring device with accessories as required to properly install devices and wall plates.
11. All devices shall be flush-mounted except as otherwise noted on the drawings.
12. Locations
 - a. Comply with layout drawings for general location; contact Owner's Representative for questions about locations and mounting methods.

- b. Relocate outlets obviously placed in a location or manner not suitable to the room finish.
 - c. Avoid placing outlets behind open doors.
 - d. Align devices vertically and horizontally. Device plates shall be aligned vertically with tolerance of 1/16". All four edges of device plates shall be in contact with the wall surface.
13. Mounting Heights as indicated on the Drawings and according to ADA requirements.
 14. Ganging of Switches - provide barriers between ganged 277 volt switches of different phases.
 15. Power Outlets - install power outlets complete with back boxes, where installed in existing buildings or extensions of existing buildings. Coordinate phase connections for rotating equipment with connections in existing building.
 16. Install device plates on all outlet boxes. Provide blank plates for all empty, spare and boxes for future devices.
 17. Caulk around edges of outdoor device plates and boxes when rough wall surfaces prevent a raintight seal. Use caulking material as approved by the Architect/Engineer.
 18. Emergency/normal power devices and/or 277V/120V devices are not to occupy the same box. Where same are shown on plans to be ganged, provide separate boxes immediately adjacent to each other.
- F. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles up.
- G. Device Plates:
1. Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
 2. Provide matching blank wall plates to cover outlet or junction boxes intended for future devices.
 3. Provide matching blank wall plates with 4 port knock outs at all telephone, data, and tele/data outlet locations. Also provide with matching blankouts in each port.
 4. Where wall plates for special devices are available only from manufacturer of device, provide designs and finishes equivalent to above specification.
 5. Verify with Architect finish of any plate where it may be apparent a special finish or color should have been specified.
- H. Switches
1. Where switches are indicated to be installed near doors, corner walls, etc., mount same not less than 2 inches and not more than 18 inches from trim. Verify exact locations with the Architect.
 2. Carefully coordinate the location of switches to insure locations at the strike side of doors.
 3. Furnish and install an engraved legend for each switch that controls exhaust fans, motors, equipment systems, etc., not located within sight of the controlling switch.
- I. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

3.2. IDENTIFICATION

- A. Comply with Division 26 Section "Identification for Electrical Systems."
1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3. FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 - 1. Test Instruments: Use instruments that comply with UL 1436.
- B. Tests for Convenience Receptacles:
 - 1. Test for correct wire terminations (no open ground, neutral, or hot).
 - 2. Test for correct polarity (no hot/ground reverse or hot/neutral reverse).
 - 3. Verify GFCI devices are operating properly.
 - 4. Using the test plug, verify that the device and its outlet box are securely mounted.

END OF SECTION 262726

SECTION 262813 – FUSES

PART 1 GENERAL

1.1. SUBMITTALS

- A. First paragraph below is defined in Division 01 Section "Submittal Procedures" as an "Action Submittal."
- B. Product Data: For each type of product indicated.
- C. Paragraph below is defined in Division 01 Section "Submittal Procedures" as an "Informational Submittal."
- D. Operation and maintenance data.

1.2. QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA FU 1 for cartridge fuses.
- C. Comply with NFPA 70.

PART 2 PRODUCTS

2.1. FUSES

A. PRODUCT

- 1. Provide fuses by Bussman or Gould Shawmut.
- 2. Provide fuses of same characteristics as scheduled to insure selective coordination of power system.
- 3. Fuses 601 amp and larger shall be U/L Class L with minimum four (4) seconds time delay at 500% rating.
- 4. Fuses 600 amp and below shall be U/L Class J, RK-1 or RK-5 as scheduled time delay sized as shown on drawings or schedules.
- 5. Special temperature conditions, motors, motor loads or other conditions requiring other types or sizes of fuses must be reviewed by the Contracting Officer. Fuse reducers are not permitted.

PART 3 EXECUTION

3.1. INSTALLATION

- A. Install fuses only after installation is complete and final tests and inspections have been made. Label fuses, switches and other fused devices with warning labels affixed in prominent location indicating type and size of fuse installed and fuse manufacturer's catalog number.
- B. Furnish Owner with spare fuses of each size and type installed on job as follows:
 - 1. 601 Amps or Larger - three (3) of each size and type
 - 2. 600 Amps or Less - 10% with minimum of three (3) of each size and type
- C. For fuse types and ampacities, see plans.
- D. Provide spare fuse cabinet with three shelves.
- E. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

END OF SECTION 262813

SECTION 262816 – ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

- A. Reference Section 260010.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Field quality-control reports.
- D. Operation and maintenance data.

1.3. QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1. DISCONNECT SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton (Cutler-Hammer)
 - 2. General Electric Company
 - 3. Siemens
 - 4. Square D
- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Lugs: Suitable for number, size, and conductor material.
 - 4. Service-Rated Switches: Labeled for use as service equipment.

2.2. FUSIBLE SWITCHES

- A. Refer to disconnect switches for all requirements in addition to the following.
- B. Switches shall be furnished with clips or bolt pads to accommodate indicated fuses.
- C. Fuse holders shall be completely accessible from front of switch and fuses shall be installed so that the label may be easily read from the front and without removing the fuse.
- D. Accessories:
 - 1. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.

2.3. MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton (Cutler-Hammer)
 - 2. General Electric Company
 - 3. Siemens
 - 4. Square D
- B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- D. Electronic Trip Circuit Breakers (where indicated on drawings or elsewhere in this specification): Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
 - 1. Instantaneous trip.
 - 2. Long- and short-time pickup levels.
 - 3. Long- and short-time time adjustments.
 - 4. Ground-fault pickup level, time delay, and I2t response.
- E. Features and Accessories (where called for or required):
 - 1. Standard frame sizes, trip ratings, and number of poles.
 - 2. Lugs: Suitable for number, size, trip ratings, and conductor material.
 - 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
 - 4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
 - 5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
 - 6. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.

2.4. ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 - 2. Outdoor Locations: NEMA 250, Type 3R.
 - 3. Kitchen and Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
 - 4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
 - 5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 EXECUTION

3.1. INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install fuses in fusible devices.

- E. Comply with NECA 1.

3.2. IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3. FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262816

SECTION 262913 – ENCLOSED CONTROLLERS**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 260010.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data: For each type of enclosed controller.
- B. Shop Drawings: For each enclosed controller. Include dimensioned plans, elevations, sections, details, and required clearances and service spaces around controller enclosures.
 - 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Field quality-control reports.
- D. Operation and maintenance data.

1.3. QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS**2.1. MOTOR STARTERS**

- A. Provide motor starters rated in accordance with NEMA and as specified and shown on plans.
 - 1. Equivalents by: G.E., Cutler Hammer, or I.T.E. Siemens, Square D.
 - 2. Install starters in locations as shown on plans, installation shall be in strict accordance with NEC, and manufacturer's installation requirements.
- B. MAGNETIC MOTOR STARTERS
 - 1. Provide 600 volt, 60 hertz AC across-the-line magnetic type rated in accordance with NEMA Standards and listed and labeled in accordance with UL Standard 508 Eleventh Edition.
 - 2. Enclosures shall be NEMA type required by starter location and environment.
 - 3. Starter shall have permanently affixed to inside of enclosure cover an easy to read wiring diagram, including alternate control variations and a warning sign indicating maximum current limiting fuse size that may be installed in disconnect switch which will limit fault current to starters withstand rating with 100,000 RMS fault current available at disconnect switch.
 - 4. Starter contacts shall be silver alloy double break replacement without removal of power wiring or starter from enclosure.
 - 5. Provide starter with solid state type overload relays on all phases. Overload thermal unit shall be one piece interchangeable construction. Overload relays shall provide phase loss and phase failure protection. Starter shall be inoperative with overload unit removed. Starters shall not be furnished to Electrical Contractor with jumper straps in overload units.
 - 6. Ampere rating for overload relays shall be selected by multiplying motor nameplate running amperes at connected voltage by .90 for motors with 1.0 service and by .95 for motors with 1.15 service factor. Use resulting amperes to enter manufacturer's overload selection tables. Keep record of thermal unit number and current range.
 - 7. Provide starter with internal wiring and control circuits prewired with only line, load, and external control circuit wiring connections required. When starter voltage exceeds 120 volts, provide 120 volt control circuit transformer with two Dual Element Fuses in transformer primary and one fuse in the secondary.

8. Starter shall be suitable for addition of at least four electrical interlocks of any arrangement of normally open or closed contacts.
9. Provide starter with the following accessories: auxiliary contacts, pilot light, and H.O.A. switch.
10. Starter applications requiring disconnect switch at starter shall be combination type motor starters in lieu of separate devices.

C. COMBINATION MAGNETIC MOTOR STARTERS

1. Provide 600 volt, 60 hertz AC across-the-line fusible or non-fusible as scheduled magnetic type rated in accordance with NEMA Standards and listed and labeled in accordance with UL Standard 508 Eleventh Edition.
2. Starter NEMA enclosure type shall be type required for starter location and environment.
3. Combination starter shall be a factory assembled unit with internal wiring and control circuits prewired with only line, load, and external control circuit wiring connections required.
4. Where fusible CMS are called for fuse holders shall be high pressure suitable for use with dual element fuses or rejection type current limiting fuses where required.
5. Fuse holders shall be completely accessible from front of switch and fuses shall be installed so that the fuse type and size may be easily read from the front and without removing the fuse.
6. All fuse holders shall have rejection clips installed.
7. See plans for combination magnetic starters.

D. MANUAL MOTOR CONTROL (1 HP Maximum)

1. Provide 300 volt, 60 cycle, AC manually operated motor starting switch meeting current NEMA Standards with proper NEMA enclosure required by starter location and environment.
2. Starter shall have heavy silver alloy contacts with quick-make, quick-break mechanism manually operated by toggle switch.
3. Thermal unit shall be melting alloy type, resettable, one-piece interchangeable construction.
4. Provide starter with all accessories such as pilot light, H.O.A. or two speed switches required to provide control sequence shown on drawings or specified. Selector switches contact shall have same ampere rating as starter switch.

PART 3 EXECUTION

3.1. INSTALLATION

- A. Wall-Mounted Controllers: Install enclosed controllers on walls with tops at uniform height, and with disconnect operating handles not higher than 79 inches above finished floor, unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Division 26 Section "Hangers and Supports for Electrical Systems."
- B. Floor-Mounted Controllers: Install enclosed controllers on 4-inch nominal-thickness concrete base.
 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install fuses in each fusible-switch enclosed controller.
- E. Install fuses in control circuits if not factory installed. Comply with requirements in Division 26 Section "Fuses."
- F. Install heaters in thermal overload relays. Select heaters based on actual nameplate full-load amperes

after motors have been installed.

- G. Comply with NECA 1.

3.2. IDENTIFICATION

- A. Identify enclosed controllers, components, and control wiring. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 2. Label each enclosure with engraved nameplate.
 3. Label each enclosure-mounted control and pilot device.

3.3. CONTROL WIRING INSTALLATION

- A. Install wiring between enclosed controllers and remote devices[and facility's central control system]. Comply with requirements in Division 26 Section "Control-Voltage Electrical Power Cables."
- B. Bundle, train, and support wiring in enclosures.
- C. Connect selector switches and other automatic-control selection devices where applicable.
 1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switch is in manual-control position.
 2. Connect selector switches with enclosed-controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.4. FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 1. Test insulation resistance for each enclosed controller, component, connecting supply, feeder, and control circuit.
 2. Test continuity of each circuit.
- C. Tests and Inspections:
 1. Inspect controllers, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
 2. Test insulation resistance for each enclosed-controller element, component, connecting motor supply, feeder, and control circuits.
 3. Test continuity of each circuit.
 4. Verify that voltages at controller locations are within plus or minus 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Architect before starting the motor(s).
 5. Test each motor for proper phase rotation.
 6. Perform each electrical test and visual and mechanical inspection stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 8. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Enclosed controllers will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5. ADJUSTING

- A. Set field-adjustable switches and overload-relay pickup and trip ranges.
- B. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable instantaneous

trip elements. Initially adjust to six times the motor nameplate full-load ampere ratings and attempt to start motors several times, allowing for motor cooldown between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Architect before increasing settings.

3.6. DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers.

END OF SECTION 262913

SECTION 264300 – SURGE PROTECTION DEVICES**PART 1 GENERAL****1.1. SCOPE**

- A. The Contractor shall furnish and install the Surge Protective Device (SPD) equipment having the electrical characteristics, ratings, and modifications as specified herein and as shown on the contract drawings. To maximize performance and reliability and to obtain the lowest possible let-through voltages, the ac surge protection shall be integrated into electrical distribution equipment such as switchgear, switchboards, panelboards, busway (integrated within bus plug), or motor control centers. Refer to related sections for surge requirements in:

1.2. RELATED SECTIONS

- A. Reference Section 260010.
- B. Section 262413 – Switchboards
- C. Section 262416 – Panelboards

1.3. SUBMITTALS

- A. The following information shall be submitted to the Engineer:
 1. Provide verification that the SPD complies with the required ANSI/UL 1449 3rd Edition listing by Underwriters Laboratories (UL) or other Nationally Recognized Testing Laboratory (NRTL). Compliance may be in the form of a file number that can be verified on UL's website or on any other NRTL's website, as long as the website contains the following information at a minimum: model number, SPD Type, system voltage, phases, modes of protection, Voltage Protection Rating (VPR), and Nominal Discharge Current (I_n).
 2. For sidemount mounting applications (SPD mounted external to electrical assembly), electrical/mechanical drawings showing unit dimensions, weights, installation instruction details, and wiring configuration.
- B. Where applicable the following additional information shall be submitted to the engineer:
 1. Descriptive bulletins
 2. Product sheets
- C. The following information shall be submitted for record purposes:
 1. Final as-built drawings and information for items listed in Section 1.04 and shall incorporate all changes made during the manufacturing process

1.4. QUALIFICATIONS

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- D. The SPD shall be compliant with the Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.
- E. SPD units and all components shall be designed, manufactured, and tested in accordance with the latest applicable UL standard (ANSI/UL 1449 3rd Edition).

1.5. DELIVERY, STORAGE AND HANDLING

- A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of manufacturer's instructions shall be included with the equipment at time of shipment.

1.6. OPERATION AND MAINTENANCE MANUALS

- A. Operation and maintenance manuals shall be provided with each SPD shipped.

PART 2 PRODUCTS

2.1. MANUFACTURERS

- A. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features, and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.
- B. Furnish Integral SPDs by one of the following:
 - 1. Eaton / Cutler-Hammer products
 - 2. Siemens
 - 3. Square D
 - 4. GE
- C. External SPDs may be furnished by the gear manufacturer (listed above) or by one of the following:
 - 1. Erico
 - 2. SSI (Surg Suppression LLC)

2.2. VOLTAGE SURGE SUPPRESSION – GENERAL

A. Electrical Requirements

- 1. Unit Operating Voltage – Refer to drawings for operating voltage and unit configuration.
- 2. Maximum Continuous Operating Voltage (MCOV) – The MCOV shall not be less than 115% of the nominal system operating voltage.
- 3. The suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards.
- 4. Protection Modes – The SPD must protect all modes of the electrical system being utilized. The required protection modes are indicated by bullets in the following table:

Configuration	Protection Modes			
	L-N	L-G	L-L	N-G
Wye	●	●	●	●
Delta	N/A	●	●	N/A
Single Split Phase	●	●	●	●
High Leg Delta	●	●	●	●

- 5. Nominal Discharge Current (I_n) – All SPDs applied to the distribution system shall have a 20kA I_n rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an I_n less than 20kA shall be rejected.
- 6. ANSI/UL 1449 3rd Edition Voltage Protection Rating (VPR) – The maximum ANSI/UL 1449 3rd Edition VPR for the device shall not exceed the following:

Modes	208Y/120	480Y/277	600Y/347
L-N; L-G; N-G	700	1200	1500
L-L	1200	2000	3000

B. SPD Design

1. Maintenance Free Design – The SPD shall be maintenance free and shall not require any user intervention throughout its life. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.
2. Balanced Suppression Platform – The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV. Designs incorporating replaceable SPD modules shall not be accepted.
3. Electrical Noise Filter – Each unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50 dB from 10 kHz to 100 MHz using the MIL-STD-220A insertion loss test method. Products unable able to meet this specification shall not be accepted.
4. Internal Connections – No plug-in component modules or printed circuit boards shall be used as surge current conductors. All internal components shall be soldered, hardwired with connections utilizing low impedance conductors.
5. Monitoring Diagnostics – Each SPD shall provide the following integral monitoring options:
 - a. Protection Status Indicators - Each unit shall have a green / red solid-state indicator light that reports the status of the protection on each phase.
 - i. For wye configured units, the indicator lights must report the status of all protection elements and circuitry in the L-N and L-G modes. Wye configured units shall also contain an additional green / red solid-state indicator light that reports the status of the protection elements and circuitry in the N-G mode. SPDs that indicate only the status of the L-N and L-G modes shall not be accepted.
 - ii. For delta configured units, the indicator lights must report the status of all protection elements and circuitry in the L-G and L-L modes.
 - iii. The absence of a green light and the presence of a red light shall indicate that damage has occurred on the respective phase or mode. All protection status indicators must indicate the actual status of the protection on each phase or mode. If power is removed from any one phase, the indicator lights must continue to indicate the status of the protection on all other phases and protection modes. Diagnostics packages that simply indicate whether power is present on a particular phase shall not be accepted.
 - b. Remote Status Monitor – The SPD must include Form C dry contacts (one NO and one NC) for remote annunciation of its status. Both the NO and NC contacts shall change state under any fault condition.
 - c. Audible Alarm and Silence Button – The SPD shall contain an audible alarm that will be activated under any fault condition. There shall also be an audible alarm silence button used to silence the audible alarm after it has been activated.
 - d. Surge Counter – The SPD shall be equipped with an LCD display that indicates to the user how many surges have occurred at the location. The surge counter shall trigger each time a surge event with a peak current magnitude of a minimum of $50 \pm 20A$ occurs. A reset pushbutton shall also be standard, allowing the surge counter to be zeroed. The reset button shall contain a mechanism to prevent accidental resetting of the counter via a single, short-duration button press. In order to prevent accidental resetting, the surge counter reset button shall be depressed for a minimum of 2 seconds in order to clear the surge count total.
 - i. The ongoing surge count shall be stored in non-volatile memory. If power to the SPD is completely interrupted, the ongoing count indicated on the surge

counter’s display prior to the interruption shall be stored in non-volatile memory and displayed after power is restored. The surge counter’s memory shall not require a backup battery in order to achieve this functionality.

6. SPD Mounting – refer to plans and panelboard schedules indicating where SPDs are required to be mounted integral to panelboards and where they may be side-mounted.
7. Overcurrent Protection
 - a. The unit shall contain thermally protected MOVs. These thermally protected MOVs shall have a thermal protection element packaged together with the MOV in order to achieve overcurrent protection of the MOV. The thermal protection element shall disconnect the MOV(s) from the system in a fail-safe manner should a condition occur that would cause them to enter a thermal runaway condition.
8. Fully Integrated Component Design – All of the SPD’s components and diagnostics shall be contained within one discrete assembly. SPDs or individual SPD modules that must be ganged together in order to achieve higher surge current ratings or other functionality shall not be accepted.
9. Safety Requirements
 - a. The SPD shall minimize potential arc flash hazards by containing no user serviceable / replaceable parts and shall be maintenance free. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.
 - b. SPDs designed to interface with the electrical assembly via conductors shall require no user contact with the inside of the unit. Such units shall have any required conductors be factory installed.
 - c. Sidemount SPDs shall be factory sealed in order to prevent access to the inside of the unit. Sidemount SPDs shall have factory installed phase, neutral, ground and remote status contact conductors factory installed and shall have a pigtail of conductors protruding outside of the enclosure for field installation.

2.3. SYSTEM APPLICATION

- A. The SPD applications covered under this section include distribution and branch panel locations, busway, motor control centers (MCC), switchgear, and switchboard assemblies. All SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C, B, and A environments.
- B. Surge Current Capacity – The minimum surge current capacity the device is capable of withstanding shall be as shown in the following table:

Minimum surge current capacity based on ANSI / IEEE C62.41 location category			
Category	Application	Per Phase	Per Mode
C	Service Entrance Locations (Switchboards, Switchgear, MCC, Main Entrance)	250 kA	125 kA
B	High Exposure Locations (Distribution Panelboards)	160 kA	80 kA
A	Branch Locations (Panelboards, MCCs, Busway)	120 kA	60 kA

- C. SPD Type – all SPDs installed on the line side of the service entrance disconnect shall be Type 1 SPDs. All SPDs installed on the load side of the service entrance disconnect shall be Type 1 or Type 2 SPDs.

2.4. LIGHTING AND DISTRIBUTION PANELBOARD REQUIREMENTS

- A. The SPD application covered under this section includes lighting and distribution panelboards. The SPD units shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category B environments.
1. The SPD shall be included and mounted within the panelboard by the manufacturer of the panelboard.
 2. The SPD shall be of the same manufacturer as the panelboard.
 3. The SPD shall not limit the use of through-feed lugs, sub-feed lugs, and sub-feed breaker options.
 4. SPDs shall be installed immediately following the load side of the main breaker. SPDs installed in main lug only panelboards shall be installed immediately following the incoming main lugs.
 5. The panelboard shall be capable of re-energizing upon removal of the SPD.
 6. The SPD shall be interfaced to the panelboard via a direct bus bar connection. Alternately, an SPD connected to a 30A circuit breaker for disconnecting purposes may be installed using short lengths of conductors as long as the conductors originate integrally to the SPD. The SPD shall be located directly adjacent to the 30A circuit breaker.
 7. The complete panelboard including the SPD shall be UL67 listed.
- B. Sidemount Mounting Applications Installation (SPD mounted external to electrical assembly)
1. Lead length between the breaker and suppressor shall be kept as short as possible to ensure optimum performance. Any excess conductor length shall be trimmed in order to minimize let-through voltage. The installer shall comply with the manufacturer's recommended installation and wiring practices.

2.5. SWITCHGEAR, SWITCHBOARD, MCC AND BUSWAY REQUIREMENTS

- A. The SPD application covered under this section is for switchgear, switchboard, MCC, and busway locations. Service entrance located SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C environments.
1. The SPD shall be of the same manufacturer as the switchgear, switchboard, MCC, and busway
 2. The SPD shall be factory installed inside the switchgear, switchboard, MCC, and/or bus plug at the assembly point by the original equipment manufacturer
 3. Locate the SPD on the load side of the main disconnect device, as close as possible to the phase conductors and the ground/neutral bar.
 4. The SPD shall be connected through a disconnect (30A circuit breaker). The disconnect shall be located in immediate proximity to the SPD. Connection shall be made via bus, conductors, or other connections originating in the SPD and shall be kept as short as possible.
 5. All monitoring and diagnostic features shall be visible from the front of the equipment.
- B. Sidemount Mounting Applications Installation (SPD mounted external to electrical assembly)
1. Lead length between the breaker and suppressor shall be kept as short as possible to ensure optimum performance. Any excess conductor length shall be trimmed in order to minimize let-through voltage. The installer shall comply with the manufacturer's recommended installation and wiring practices.

2.6. ENCLOSURES

- A. All enclosed equipment shall have NEMA 1 general purpose enclosures, unless otherwise noted. Provide enclosures suitable for locations as indicated on the drawings and as described below:
1. NEMA 1 – Constructed of a polymer (units integrated within electrical assemblies) or steel (sidemount units only), intended for indoor use to provide a degree of protection to personal access to hazardous parts and provide a degree of protection against the ingress of solid foreign objects (falling dirt).

2. NEMA 4 – Constructed of steel intended for either indoor or outdoor use to provide a degree of protection against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (dirt and windblown dust); to provide a degree of protection with respect to the harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water, and hose directed water); and that will be undamaged by the external formation of ice on the enclosure. (sidemount units only)
3. NEMA 4X – Constructed of stainless steel providing the same level of protection as the NEMA 4 enclosure with the addition of corrosion protection. (sidemount units only)

PART 3 EXECUTION

3.1. FACTORY TESTING

- A. Standard factory tests shall be performed on the equipment under this section. All tests shall be in accordance with the latest version of NEMA and UL standards.

3.2. INSTALLATION

- A. The Contractor shall install all equipment per the manufacturer's recommendations and the contract drawings.

3.3. WARRANTY

- A. The manufacturer shall provide a full ten (10) year warranty from the date of shipment against any SPD part failure when installed in compliance with manufacturer's written instructions and any applicable national or local code.

END OF SECTION 264300

SECTION 265000 – LIGHTING**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 260500.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data:
 - 1. Arrange in order of luminaire designation.
 - 2. Include data on features, accessories, and finishes.
 - 3. Include physical description and dimensions of luminaires.
 - 4. Include emergency lighting units, including batteries and chargers.
 - 5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
 - 6. Photometric data and adjustment factors based on laboratory tests
- B. Shop Drawings: Show details of nonstandard or custom lighting fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories.
- C. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, signed by product manufacturer.
- D. Field quality-control test reports.
- E. Seismic Qualification Certificates: For luminaires, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

PART 2 - PRODUCTS**2.1. INSPECTION**

- A. Prior to installation of luminaires Electrical Contractor shall inspect luminaire and verify unit meets or exceeds specifications, is new and unused without damage or defect and is suitable for the intended service.
- B. See architectural and electrical plans for luminaire locations, coordinate installation with other trades. At the completion of the project all luminaires shall be aligned, level and cleaned to the satisfaction of the A/E.

2.2. EQUIVALENT MANUFACTURERS

- A. The following light fixture manufacturers are generally approved equals to those manufacturers listed in the Lighting Fixture Schedule on the drawings. The approval herein no way relieves the contractor of meeting all specification requirements. All light fixtures substituted for fixtures specified on drawings must conform in materials, dimensions, appearance, performance, and be of equal quality to the fixture specified and described in the Lighting Fixture Schedule. Fixture manufacturers not listed here must be submitted and approved a minimum of 10 days prior to bid.
- B. Provide luminaires by the following manufacturers:
- C. LED/Fluorescent Troffer Type: Columbia, Cooper (Metalux), Daybrite, Elite, Finelite, Focal Point, Lithonia, Williams
 - 1. Equivalent troffers shall be considered the following: Columbia (PS Series), Cooper (Metalux GC Series), Daybrite (SP Series), Elite (OT Series), Finelite (HPR Series), Lithonia (SP Series), Williams (50 Series)

- D. Strip Fluorescents: Birchwood, Columbia, Daybrite, Elite, ILP, Lithonia, Metalux, Paramount, Prudential, Utopia Lighting, Williams
- E. Industrial: ABS Lighting, Crouse Hinds, Daybrite, Gardco, G.E., Holophane, Hubbell, Lumark, Kim, Lithonia, SPI, Williams
- F. Exit Signs and Emergency Lights: Beghelli, Chloride, Concealite, Devine, Dual-Lite, EELP, Elite, Emergi-Lite, Evenlite, Exitronix, Fail-Safe, Hubbell, Isolite, Lithonia, Prescolite, Surelites, Crouse Hinds, Williams.
- G. LED lamps and Modules: Philips, General Electric, Osram/Sylvania, Cree, Nichia.
- H. LED Power Supplies: Osram/Sylvania, General Electric, Philips.

2.3. LUMINAIRES

- A. Provide luminaires complete with lamps and accessories required for hanging. Contractor shall insure that lamps, reflector lens and trim are clean at time of final inspection. Mount recessed luminaires with trim flush to ceilings, free of gaps or cracks.
- B. Coordinate mounting of ceiling mounted luminaires with General Contractor. Where additional supports are required due to luminaire location or weight, electrical contractor shall provide supports, unless otherwise specified under ceiling specifications.
- C. Consult architectural plans and existing conditions where applicable for ceiling types and provide surface and recessed lighting fixtures with appropriate mounting components and accessories. Verify mounting requirements prior to ordering and shop drawing submission.
- D. All fixtures and components mounted in areas lower than 8'-0" or in mechanical, electrical or service type areas subject to circulation of staff or maintenance shall be coordinated prior to installation so as to minimize damage or injury. Any devices or fixtures mounted without coordination/notification with architect that become hazards to walk paths or subject to damage shall be moved at no expense to the owner at the satisfaction of the architect/engineer. (ie. if a fixture can be located a short distance away that avoids a beam or prevents it from being mounted 3" above a persons head that should be coordinated prior to installation)
- E. Fixtures mounted in fire rated ceilings shall be provided and installed with fire rated enclosures to maintain ceiling integrity. Provide engineered products by EZ-Barrier, Tenmat or similar products or provide enclosures fabricated in accordance with building code and UL requirements. Maintain all fixture required heat sink and other clearances.

2.4. LED LIGHTING SYSTEMS

- A. LED components, lamps, drivers, and fixtures shall comply with: PCC 47 CFR Part 15; UL 8750; ANSI/NEMA Standards C78.377, NEMA SSL-1, C82.77, IESNA Standards TM-16-05, RP-16, LM-79, LM-80 and TM-21.
- B. The LED module itself and all its components must not be subject to mechanical stress.
- C. Assembly must not damage or destroy conducting paths on the circuit board.
- D. Installation of LED modules (with power supplies) shall adhere to all applicable electrical and safety standards.
- E. Correct polarity shall be clearly identified.
- F. LED module must be protected from unbalanced voltage drop, and/or overload.
- G. Ensure that the power supply is of adequate power to operate the load.
- H. Install system according to manufacturer's heat sinking parameters.
- I. For applications involving exposure to humidity and dust, the module shall be protected by a fixture or housing with a suitable protection glass. The module shall be protected against condensation water by treatment with an appropriate circuit board conformal coating. The conformal coating should have the following features.
 1. Optical transparency
 2. UV resistance
 3. Thermal expansion properties matching those of the module (15-30 x 10⁻⁶cm/cm/K)
 4. Low permeability of steam for all climate conditions
 5. Resistance against corrosive environments

- J. The LED module shall be operated with an electronically stabilized power supply offering protection against short circuits overload and overheating.
- K. All drivers used for supplying power to LED arrays in lighting fixtures shall be by the light fixture manufacturer.
- L. Drivers shall be integral to the fixture unless otherwise shown or specified.

PART 3 - EXECUTION

3.1. LUMINAIRES

- A. All light fixtures shall be cleaned and free of all construction debris. Install units as shown and detailed on the plans and per manufacturers' directions.
- B. Reference luminaire schedule on plans for specific luminaire, lamp, and ballast requirements.
- C. Reinstall any fixtures called out for relocation or remounting in renovation areas as though they are new fixtures. Make all provisions to properly mount and support existing fixtures being reused.
- D. Luminaires submitted must meet or exceed specified luminaire in performance and construction and appearance. Provide luminaires at each location shown on drawings. Luminaires shall be in accordance with type designation on drawings.

3.2. ADJUSTMENTS

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
- B. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
- C. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
- D. Adjust the aim of luminaires in the presence of the Architect.

3.3. FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
- B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 265000

SECTION 265100 – INTERIOR LIGHTING**PART 1 - GENERAL****1.1. RELATED DOCUMENTS**

- A. Reference Section 260010.
- B. Reference Section 260500 for general requirements of all light fixtures.
- C. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

PART 2 - PRODUCTS**2.1. LUMINAIRES**

- A. Provide luminaires complete with lamps and accessories required for hanging. Contractor shall insure that lamps, reflector lens and trim are clean at time of final inspection. Mount recessed luminaires with trim flush to ceilings, free of gaps or cracks.
- B. Coordinate mounting of ceiling mounted luminaires with General Contractor. Where additional supports are required due to luminaire location or weight, electrical contractor shall provide supports, unless otherwise specified under ceiling specifications.
- C. Consult architectural plans and existing conditions where applicable for ceiling types and provide surface and recessed lighting fixtures with appropriate mounting components and accessories. Verify mounting requirements prior to ordering and shop drawing submission.
- D. Fixtures mounted in fire rated ceilings shall be provided and installed with fire rated enclosures to maintain ceiling integrity. Provide engineered products by EZ-Barrier, Tenmat or similar products or provide enclosures fabricated in accordance with building code and UL requirements. Maintain all fixture required heat sink and other clearances.
- E. Provide troffer luminaires with the following devices wherever possible and not specified otherwise on the luminaire schedule: cam latches, 100% door gasketing, post fabrication painted finish, t-bar clips, lens clips, suspension tabs, and a minimum of 0.125" lens.

2.2. LAMPS

- A. Lamps shall be lamp types recommended by luminaire manufacturer. Lamp no fixtures above manufacturers recommended maximum wattages.
- B. Incandescent lamps shall be inside frosted (IF) type unless otherwise called for in luminaire schedule.
- C. Low-Mercury Fluorescent Lamps: Comply with EPA's toxicity characteristic leaching procedure test; shall yield less than 0.2 mg of mercury per liter when tested according to NEMA LL 1.
- D. T8 Rapid-Start low-mercury Fluorescent Lamps: Rated 32 W maximum, nominal length 48 inches, 2800 initial lumens (minimum), CRI 75 (minimum), color temperature 4100 K, and average rated life 20,000 hours, unless otherwise indicated.
- E. T5 rapid-start low-mercury lamps, rated 28 W maximum, nominal length of 45.2 inches, 2900 initial lumens (minimum), CRI 85 (minimum), color temperature 4100 K, and average rated life of 20,000 hours, unless otherwise indicated.
- F. T5HO rapid-start, high-output low-mercury lamps, rated 54 W maximum, nominal length of 45.2 inches, 5000 initial lumens (minimum), CRI 85 (minimum), color temperature 4100 K, and average rated life of 20,000 hours, unless otherwise indicated.
- G. MR16 Halogen Lamps: 12V, 10,000 Hours Average Life, Universal Burn Position, Color Temperature 3100K, Spot, Narrow Flood, and Flood beam spreads. Ushio Ultraline only.
- H. Equivalent lamps by General Electric, Venture, Phillips, Sylvania, or Eiko.

2.3. FLUORESCENT BALLASTS**A. BALLASTS FOR LINEAR FLUORESCENT LAMPS**

- 1. Electronic Ballasts: Comply with ANSI C82.11; instant and programmed-start type, unless otherwise indicated, and designed for type and quantity of lamps served. Ballasts shall be

designed for full light output unless dimmer or bi-level control is indicated. 120/277 dual rated.

- a. Sound Rating: A.
 - b. See Evaluations for discussion of harmonic considerations.
 - c. Total Harmonic Distortion Rating: Less than 10 percent.
 - d. Transient Voltage Protection: IEEE C62.41, Category A or better.
 - e. Consider specifying the higher frequency in subparagraph below if fixtures with default ballasts are used in proximity to infrared sensors.
 - f. BF: 0.88 or higher.
 - g. Power Factor: 0.98 or higher.
 - h. Parallel Lamp Circuits: Multiple lamp ballasts shall comply with ANSI C 82.11 and shall be connected to maintain full light output on surviving lamps if one or more lamps fail.
2. Electronic Programmed-Start Ballasts for T5 and T5HO Lamps: Comply with ANSI C82.11 and the following:
 - a. Lamp end-of-life detection and shutdown circuit for T5 diameter lamps.
 - b. Automatic lamp starting after lamp replacement.
 - c. Sound Rating: A.
 - d. Total Harmonic Distortion Rating: Less than 20 percent.
 - e. Transient Voltage Protection: IEEE C62.41, Category A or better.
 - f. Operating Frequency: 42 kHz or higher.
 - g. Lamp Current Crest Factor: 1.7 or less.
 - h. BF: 0.95 or higher, unless otherwise indicated.
 - i. Power Factor: 0.95 or higher.
 3. Electromagnetic Ballasts: Comply with ANSI C82.1; energy saving, high-power factor, Class P, and having automatic-reset thermal protection.
 4. Single Ballasts for Multiple Lighting Fixtures: Factory-wired with ballast arrangements and bundled extension wiring to suit final installation conditions without modification or rewiring in the field.
 5. Ballasts for Low-Temperature Environments:
 - a. Temperatures 0 Deg F and Higher: Electronic or electromagnetic type rated for 0 deg F starting and operating temperature with indicated lamp types.
 - b. Temperatures Minus 20 Deg F and Higher: Electromagnetic type designed for use with indicated lamp types.
 6. Ballasts for Low Electromagnetic-Interference Environments: Comply with 47 CFR, Chapter 1, Part 18, Subpart C, for limitations on electromagnetic and radio-frequency interference for consumer equipment.
 7. Ballasts for Dimmer-Controlled Lighting Fixtures: Electronic type.
 - a. Dimming Range: 100 to 5 percent of rated lamp lumens.
 - b. Ballast Input Watts: Can be reduced to 20 percent of normal.
 - c. Compatibility: Certified by manEMERGENCY FLUORESCENT POWER UNIT
- B. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.
1. Emergency Connection: Operate 1 fluorescent lamp(s) continuously at an output of 1200 lumens each. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
 2. Night-Light Connection: Operate one fluorescent lamp continuously.
 3. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.

- a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
4. Battery: Sealed, maintenance-free, nickel-cadmium type.
 5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
 6. Provide 5-year warranty.
 7. Battery packs shall be Bodine B-50 or Iota I-232. Equivalent by Lithonia.
- C. External Type: Self-contained, modular, battery-inverter unit, suitable for powering one or more fluorescent lamps, remote mounted from lighting fixture. Comply with UL 924.
1. Emergency Connection: Operate one fluorescent lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
 2. Night-Light Connection: Operate one fluorescent lamp in a remote fixture continuously.
 3. Battery: Sealed, maintenance-free, nickel-cadmium type.
 4. Charger: Fully automatic, solid-state, constant-current type.
 5. Housing: NEMA 250, Type 1 enclosure.
 6. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 7. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 8. Provide 5-year warranty.
 9. Battery packs shall be Bodine B-50 or Iota I-232. Equivalent by Lithonia.

2.4. EMERGENCY LED DRIVER

- A. Emergency LED driver specified herein is by Iota (CP Series). Approved equals by Bodine.
1. The emergency driver shall accommodate an LED load with a forward voltage requirement ranging from 10 to 60 VDC.
 2. The output voltage sensing shall be automatic and instantaneous with a resulting, inversely-proportional current to maintain constant power to the LED array with an output tolerance of +/- 3%.
 3. The unit shall supply the rated load for a minimum of 1 1/2 hours or to 87 1/2% of rated battery terminal voltage.
 4. The output power to the LED load during emergency operation shall be held constant (refer to plans for wattage) from minute one throughout the entire emergency run time resulting in no loss or degradation of the light source during emergency operation.
 5. The unit shall be furnished with an electronic, AC-lockout circuit which will connect the battery when the AC circuit is activated, and an electronic brownout circuit which will enable a transfer to emergency operation when utility power dips below an acceptable level.
- B. Installation
1. Emergency drivers shall be UL-listed for use with respective LED array and/or UL-listed for field installation. Where drivers are only listed for use with a respective LED array, they shall be installed integral to the fixture by the fixture manufacturer.
 2. Maximum remote mounting distance of the emergency driver shall be 50-feet
- C. Driver: Constant Power emergency LED driver system as indicated on the plans. The emergency driver system shall be UL class 2 certified in accordance with UL 1310 and shall be UL listed for use in damp locations with a temperature range of 0° to 55° C.
- D. AC input: Two-wire, universal voltage capable 120 thru 277 VAC, 50/60 Hz and be UL Classified to Category Control Number (CCN) FTBR, Emergency Lighting and Power Equipment, and FTBV, Emergency Light-Emitting-Diode Drivers for field installation.
- E. Battery: Self-contained, high-temperature, sealed, maintenance-free nickel cadmium battery rated

for a 10-year service life.

- F. Charger: two-stage charging system which samples the battery in relation to its temperature, state of charge and input voltage fluctuations. The charger shall be current limited, temperature compensated, short-circuit protected with reverse polarity protection. The unit shall achieve a full recharge in 24-hours.
- G. Protection: A low voltage battery disconnect (LVD) circuit shall be provided and will disconnect the load and circuitry from the battery when it reaches approximately 80 to 85% of its nominal terminal voltage, preventing a non-recoverable, deep-discharge condition as well as equipment initialization failure when utility power is restored.
- H. Housing: NEMA 250, Type 1 enclosure.
- I. Test Push Button: Illuminated push-to-test switch.
- J. Provide 5-year warranty.

PART 3 - EXECUTION

3.1. LUMINAIRES

- A. Luminaire supports shall comply with the latest edition of the NEC Sections 410-30 and 410-36. Provide luminaire securing clips or otherwise securely fasten fixtures to ceiling grid. At least two support wires shall be connected from the structure above to each troffer style light fixture.

3.2. INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. All light fixtures shall be cleaned and free of all construction debris. Install units as shown and detailed on the plans and per manufacturers' directions.
- C. Support for Lighting Fixtures in or on Grid-Type Suspended Ceilings: Use grid as a support element.
 - 1. Install a minimum of two ceiling support system rods or wires for each fixture. Locate not more than 6 inches from lighting fixture corners.
 - 2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 - 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
 - 4. Install at least two independent support rods or wires from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
 - 5. Fixtures shall not be supported by the ceiling structure only without being installed in a ceiling listed, designed and installed for proper support of fixtures. Cables, clips, etc may not be omitted without documentation of ceiling capacity and design and installation is listed for such use and as applied for the project.
- D. Suspended Lighting Fixture Support:
 - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 - 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
- E. Air-Handling Lighting Fixtures: Install with dampers open and ready for adjustment.
- F. Adjust aimable lighting fixtures to provide required light intensities
- G. Recessed luminaires installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and labeled as having an air leakage rate not more than 2.0 cfm (0.944 L/s) when tested in accordance with ASTM E 283 at a 1.57 psf (75 Pa) pressure differential. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.
- H. Recessed luminaires installed in rated assemblies shall be installed per UL listing requirements to maintain the rating of the construction. Provide sheet rock enclosures or other UL listed

manufactured assemblies to maintain rating of construction and listing of fixtures for heat dissipation and clearances.

END OF SECTION 265100

SECTION 280500 – COMMON WORK FOR ELECTRONIC SAFETY & SECURITY

PART 1 GENERAL

1.1. RELATED DOCUMENTS

- A. Division 26 specifications govern the construction methods, materials and other aspects related to electrical work contained in these Division 28 specifications.
- B. Reference
 - 1. Section 260010 - Electrical Provisions
 - 2. Section 260011 - Basic Electrical Materials And Methods
 - 3. Section 260013 - Project Coordination
 - 4. As well as other Division 26 Sections for any other electrical requirements and provisions.
- C. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 280500

SECTION 280505 – ELECTRONIC SAFETY AND SECURITY DEMOLITION

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

- A. Section 260505
- B. Section 280500
- C. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 280505

SECTION 284605 – CONDUCTORS/CABLES FOR ELECTRONIC SAFETY & SECURITY

PART 1 GENERAL

1.1. RELATED DOCUMENTS

- A. Section 280500
- B. Division 26 Sections for other electrical requirements and provisions.
- C. 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. Fire alarm wire and cable.

1.3. SUBMITTALS

- A. Product Data: For each type of wire/cable to be installed.

1.4. QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.5. PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 PRODUCTS

2.1. PATHWAYS

- A. Support of Open Cabling: NRTL labeled for support of cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
 - 2. Lacing bars, spools, J-hooks, and D-rings.
 - 3. Straps and other devices.
- B. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." Flexible metal conduit shall not be used.

2.2. FIRE ALARM WIRE AND CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Honeywell Cable
 - 2. Belden
 - 3. West Penn Wire
 - 4. Allied Wire and Cable
- B. General Wire and Cable Requirements:
 - 1. NRTL listed and labeled as complying with NFPA 70, Article 760.
 - 2. Generally, cable insulation color shall be red. Refer to Part 3, Execution for further direction.
- C. Signaling Line Circuits:
 - 1. Areas/cables requiring Level 0 or Level 1 Survivability (per NFPA 72):

- a. Unshielded twisted pair (UTP), minimum No. 16 AWG unless larger size recommended by system manufacturer.
- 2. Areas/cables requiring Level 2 or Level 3 Survivability (per NFPA 72):
 - a. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a 2-hour rating.
 - b. UTP Cable (per C.1) where installed in a rated enclosure (chase, etc.)
- D. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 - 1. Low-Voltage Circuits: No. 16 AWG, minimum.
 - 2. Line-Voltage Circuits: No. 12 AWG, minimum.

PART 3 EXECUTION

3.1. INSTALLATION OF PATHWAYS

- A. Comply with requirements in Division 26 Section "Raceways and Boxes" for installation of conduits and wireways.

3.2. FIRE ALARM WIRING INSTALLATION

- A. Comply with NECA 1 and NFPA 72.
- B. Wiring Method:
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system where exposed. This system shall not be used for any other wire or cable.
 - a. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
 - 3. Fire-Rated Cables: Use of 2-hour, fire-rated fire alarm cables, NFPA 70, Types MI and CI, is permitted.
 - 4. Signaling Line Circuits: Power-limited fire alarm cables may be installed in the same cable or raceway as signaling line circuits.
- C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
- E. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red. Generally cabling shall be red.
- F. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signals from other floors or zones.
- G. Wiring to Remote Alarm Transmitting Device: 1-inch (25-mm) conduit between the fire alarm control panel and the transmitter. Install number of conductors and electrical supervision for

connecting wiring as needed to suit monitoring function.

3.3. CONNECTIONS

- A. Comply with requirements in all other Division 26 and 28 Sections for connecting, terminating, and identifying wires and cables.

3.4. GROUNDING

- A. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding"

3.5. IDENTIFICATION

- A. Identify system components, wiring, and cabling. Comply with requirements for identification specified in Division 26 Section "Electrical Identification."

3.6. FIELD QUALITY CONTROL

- A. Perform tests and inspections.

END OF SECTION 284605

SECTION 284611 – FIRE SENSORS AND DETECTORS**PART 1 GENERAL****1.1. RELATED DOCUMENTS**

- A. Section 280500
- B. Section 284620 for existing fire alarm systems
- C. Section 284621 for new fire alarm systems
- D. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Refer to fire alarm system section for additional requirements.

PART 2 PRODUCTS**2.1. MANUFACTURERS**

- A. Devices specified herein shall be by the same manufacturer and/or family as the fire alarm system control panel.

2.2. SYSTEM SMOKE DETECTORS

- A. General Requirements for System Smoke Detectors:
 - 1. Comply with UL 268; operating at 24-V dc, nominal.
 - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
 - 3. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - 4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - 5. Integral Visual-Indicating Light: LED type indicating detector has operated.
- B. Photoelectric Smoke Detectors:
 - 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 - 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).

2.3. HEAT DETECTORS

- A. General Requirements for Heat Detectors: Comply with UL 521.
- B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or a rate of rise that exceeds 15 deg F per minute unless otherwise indicated.
 - 1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
 - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
- C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature

of 190 deg F.

1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

PART 3 EXECUTION

3.1. EQUIPMENT INSTALLATION

- A. Smoke- or Heat-Detector Spacing:
 1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
 2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
 3. Smooth ceiling spacing shall not exceed 30 feet.
 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to NFPA 72.
 5. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.
 6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.
 7. Fire alarm panels and power extenders: Provide smoke detectors above all panels and components as required by NFPA.
- B. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.
- C. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

3.2. IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Electrical Identification."

3.3. FIELD QUALITY CONTROL

- A. Refer to general fire alarm system requirements.

END OF SECTION 284611

SECTION 284612 – OTHER INITIATING DEVICES**PART 1 GENERAL****1.1. RELATED DOCUMENTS**

- A. Section 280500
- B. Section 284620 for existing fire alarm systems
- C. Section 284621 for new fire alarm systems
- D. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Refer to fire alarm system section for additional requirements.

PART 2 PRODUCTS**2.1. MANUFACTURERS**

- A. Devices specified herein shall be by the same manufacturer and/or family as the fire alarm system control panel.

2.2. MANUAL FIRE-ALARM BOXES

- A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
 - 1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 - 2. Station Reset: Key- or wrench-operated switch.
 - 3. Indoor Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
 - 4. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.3. ADDRESSABLE INTERFACE DEVICE

- A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.
- B. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall or to circuit-breaker shunt trip for power shutdown.
- C. Provide same at all waterflow and/or tamper switches, and as otherwise required to furnish a complete and operational system.
 - 1. Exact locations shall be coordinated with fire sprinkler contractor.

PART 3 EXECUTION**3.1. EQUIPMENT INSTALLATION**

- A. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.
- B. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.2. IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Electrical Identification."

3.3. FIELD QUALITY CONTROL

- A. Refer to general fire alarm system requirements.

END OF SECTION 284612

SECTION 284613 – OTHER FIRE ALARM DEVICES

PART 1 GENERAL

1.1. RELATED DOCUMENTS

- A. Section 280500
- B. Section 284620 for existing fire alarm systems
- C. Section 284621 for new fire alarm systems
- D. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Refer to fire alarm system section for additional requirements.

PART 2 PRODUCTS

2.1. MANUFACTURERS

- A. Devices specified herein shall be by the same manufacturer and/or family as the fire alarm system control panel.

2.2. REMOTE ANNUNCIATOR

- A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
 - 1. Mounting: Flush cabinet, NEMA 250, Type 1.
- B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

PART 3 EXECUTION

3.1. EQUIPMENT INSTALLATION

- A. Annunciator: Install with top of panel not more than 54 inches above the finished floor.

3.2. IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Electrical Identification."

3.3. FIELD QUALITY CONTROL

- A. Refer to general fire alarm system requirements.

END OF SECTION 284613

SECTION 284620 – FIRE-ALARM SYSTEM MODIFICATIONS**PART 1 GENERAL****1.1. RELATED DOCUMENTS**

- A. Section 280500
- B. Section 284611 for detection devices
- C. Section 284612 for other initiating devices
- D. Section 284613 for other fire alarm devices
- E. Section 284623 for notification devices
- F. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SYSTEM DESCRIPTION

- A. This scope is to provide additional devices and modifications to the existing building systems. All components required for a complete fire alarm system as shown on plans and as necessary to upgrade and modify the existing system. Contractor shall field verify necessary components prior to bid.

1.3. SUBMITTALS

- A. General Submittal Requirements:
 - 1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
 - 2. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified fire-alarm technician, Level III minimum.
- B. Product Data: For each type of product indicated.
- C. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
 - 2. Include voltage drop calculations for notification appliance circuits.
 - 3. Include battery-size calculations.
 - 4. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 - 5. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
 - 6. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.
- D. Delegated-Design Submittal: For smoke and heat detectors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Drawings showing the location of each smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the detector.
 - 2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72.

- E. Qualification Data: For qualified Installer.
- F. Field quality-control reports.
- G. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - 2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
 - 3. Record copy of site-specific software.
 - 4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
 - a. Frequency of testing of installed components.
 - b. Frequency of inspection of installed components.
 - c. Requirements and recommendations related to results of maintenance.
 - d. Manufacturer's user training manuals.
 - e. Manufacturer's required maintenance related to system warranty requirements.
 - f. Abbreviated operating instructions for mounting at fire-alarm control unit.
 - g. Copy of NFPA 25.
- H. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On USB stick or other digital media, complete with data files.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.

1.4. QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III technician.
- C. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.5. SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning with Substantial Completion, provide software support for two years.
- C. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.

PART 2 PRODUCTS

2.1. MANUFACTURERS

- A. The fire alarm control panel for the building is a Simplex 4020 Series panel. Contractor to field verify exact model. New devices, equipment, monitoring, initiation, notification, etc. shall connect to the existing fire alarm control panel and be compatible with same.
- B. Provide all necessary equipment, wiring, software upgrades, modifications, etc. as required to

support the additional devices from the existing FACP.

2.2. SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
1. Manual stations.
 2. Heat detectors.
 3. Smoke detectors.
 4. Automatic sprinkler system water flow.
 5. Heat detectors in elevator shaft and pit.
 6. Fire standpipe system.
- B. Fire-alarm signal shall initiate the following actions:
1. Continuously operate alarm-notification appliances.
 2. Identify alarm at the fire-alarm control unit and remote annunciators.
 3. Transmit an alarm signal to the remote alarm receiving station.
 4. Recall elevators to primary or alternate recall floors.
 5. Record events in the system memory.
- C. Supervisory signal initiation shall be by one or more of the following devices and actions:
1. Duct Smoke Detectors.
 2. Valve supervisory switch.
 3. Elevator shunt-trip supervision.
- D. System trouble signal initiation shall be by one or more of the following devices and actions:
1. Open circuits, shorts, and grounds in designated circuits.
 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 3. Loss of primary power at fire-alarm control unit.
 4. Ground or a single break in fire-alarm control unit internal circuits.
 5. Abnormal ac voltage at fire-alarm control unit.
 6. Break in standby battery circuitry.
 7. Failure of battery charging.
 8. Abnormal position of any switch at fire-alarm control unit or annunciator.
- E. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators.

PART 3 EXECUTION

3.1. EQUIPMENT INSTALLATION

- A. Comply with NFPA 72 for installation of new fire-alarm equipment.
- B. Equipment Mounting: Install fire-alarm control unit on finished floor with tops of cabinets not more than 72 inches above the finished floor.
- C. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
1. Connect new equipment to existing control panel in existing part of the building.
 2. Connect new equipment to existing monitoring equipment at the supervising station.
 3. Expand, modify, and supplement existing control or monitoring equipment as necessary to extend existing control or monitoring functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.
- D. Power Extenders: Located in electrical closets, mechanical spaces or otherwise in unobtrusive locations. Extenders in shell spaces shall be located in unobtrusive locations and not in locations that will conflict with future buildout. Provide smoke detectors above panels.

- E. Annunciator: Install with top of panel not more than 72 inches above the finished floor.

3.2. CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Alarm-initiating connection to elevator recall system and components.
 - 2. Supervisory connections at valve supervisory switches.
 - 3. Supervisory connections at elevator shunt trip breaker.

3.3. IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- B. Install framed instructions in a location visible from fire-alarm control unit.

3.4. GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.5. FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by authorities having jurisdiction.
- B. Tests and Inspections:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
 - b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 - 4. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 - 5. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
- C. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- D. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

- F. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- G. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

END OF SECTION 284620

SECTION 284623 – FIRE ALARM NOTIFICATION APPLIANCES**PART 1 GENERAL****1.1. RELATED DOCUMENTS**

- A. Section 280500
- B. Section 284620 for existing fire alarm systems
- C. Section 284621 for new fire alarm systems
- D. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Refer to fire alarm system section for additional requirements.

PART 2 PRODUCTS**2.1. MANUFACTURERS**

- A. Devices specified herein shall be by the same manufacturer and/or family as the fire alarm system control panel.

2.2. GENERAL REQUIREMENTS

- A. Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.
 - 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.
 - 2. Mounting: Wall mounted unless otherwise indicated.
 - 3. Mounting Faceplate: Factory finished. Coordinate red or white color of device with architect.

2.3. AUDIBLE NOTIFICATION REQUIREMENTS

- A. Chimes, Low-Level Output: Vibrating type, 75-dBA minimum rated output.
- B. Chimes, High-Level Output: Vibrating type, 81-dBA minimum rated output.
- C. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.

2.4. VISIBLE NOTIFICATION REQUIREMENTS

- A. Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- high letters on the lens.
 - 1. Rated Light Output:
 - a. 15/30/75/110 cd, selectable in the field.
 - 2. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 - 3. Flashing shall be in a temporal pattern, synchronized with other units.
 - 4. Strobe Leads: Factory connected to screw terminals.

PART 3 EXECUTION**3.1. EQUIPMENT INSTALLATION**

- A. Comply with NFPA 72 for notification devices.
- B. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.

- C. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling.
- D. Provide wire guards over all indicating devices or devices subject to damage in gymnasium or similar spaces.

3.2. IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Electrical Identification."

3.3. FIELD QUALITY CONTROL

- A. Refer to general fire alarm system requirements.

END OF SECTION 284623

SECTION 284624 – FIRE ALARM INTERFACES TO REMOTE MONITORING**PART 1 GENERAL****1.1. RELATED DOCUMENTS**

- A. Section 280500
- B. Section 284620 for existing fire alarm systems
- C. Section 284621 for new fire alarm systems
- D. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Refer to fire alarm system section for additional requirements.

PART 2 PRODUCTS**2.1. MANUFACTURERS**

- A. Equipment specified herein shall be by the same manufacturer and/or family as the fire alarm system control panel, or listed for use with same.

2.2. DIGITAL ALARM COMMUNICATOR TRANSMITTER

- A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.
- B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture one telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.
- C. Local functions and display at the digital alarm communicator transmitter shall include the following:
 - 1. Verification that both telephone lines are available.
 - 2. Programming device.
 - 3. LED display.
 - 4. Manual test report function and manual transmission clear indication.
 - 5. Communications failure with the central station or fire-alarm control unit.
- D. Digital data transmission shall include the following:
 - 1. Address of the alarm-initiating device.
 - 2. Address of the supervisory signal.
 - 3. Address of the trouble-initiating device.
 - 4. Loss of ac supply or loss of power.
 - 5. Low battery.
 - 6. Abnormal test signal.
 - 7. Communication bus failure.
- E. Secondary Power: Integral rechargeable battery and automatic charger.
- F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.3. FIRE ALARM WIRELESS/CELLULAR COMMUNICATOR

- A. Communicator shall be acceptable for reporting to remote central station and shall comply with UL 864 and be listed and labeled by an NRTL.

B. Communicator may be used as a sole communications method or as part of multiple communications technologies in conjunction with the DACT.

1. Cellular signal shall operate on 2G, 3G, or 4G networks.

C. Self-Test: Conducted automatically as required by adopted version of NFPA 72.

2.4. FIRE ALARM IP/GSM COMMUNICATOR

A. Communicator shall be acceptable for reporting to remote central station and shall comply with UL 864 and be listed and labeled by an NRTL.

B. Communicator may be used as a sole communications method or as part of multiple communications technologies in conjunction with the DACT.

1. Cellular signal shall operate on 2G, 3G, or 4G networks.

2. Communicator may be used in the following configurations

a. Cellular only

b. IP only

c. IP primary / cellular backup.

C. Self-Test: Conducted automatically as required by adopted version of NFPA 72.

PART 3 EXECUTION

3.1. EQUIPMENT INSTALLATION

A. Comply with NFPA 72

3.2. CONNECTIONS

A. Make connections from control panel and/or DACT to supervisory station.

1. Connection to station shall be by two of the following methods:

a. Dedicated telephone line (POTS / Plain Old Telephone Service)

b. IP (including Voice over IP)

c. Cellular

2. Connection methods shall comply with all applicable sections of NFPA 72 (edition as adopted by state and/or local AHJ) and local/state fire marshal requirements.

3.3. IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.4. FIELD QUALITY CONTROL

A. Refer to general fire alarm system requirements.

END OF SECTION 284624