

MIAMI COUNTY BOARD OF COMMISSIONERS
REQUEST FOR BIDS: MIAMI COUNTY COMMISSIONER'S HEARING ROOM RENOVATION



MIAMI COUNTY COMMISSIONER'S HEARING ROOM RENOVATION

PROJECT ADDRESS:

201 West Main Street
Troy, Ohio 45373

Legal Advertisement, General Specifications, Detailed Specifications, Bid Form, Bond and Contract Documents

BOARD OF MIAMI COUNTY COMMISSIONERS

Ted S. Mercer, President
Wade H. Westfall, Vice President
Gregory A. Simmons, Member

MIAMI COUNTY BID PACKAGE & GENERAL REQUIREMENTS

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NOTICE TO BIDDERS (ORC Section 307.86)

Sealed Bid proposals will be received by Board of Miami County Commissioners in the Commissioner's Office at 201 W Main St, Troy, OH 45373 until **1:35 PM on THURSDAY, January 29, 2026**, at which time and place bid proposals will be opened publicly and read aloud. Bid proposals received after **1:35 PM on THURSDAY, January 29, 2026**, will be returned unopened. Bids shall be for the furnishing of materials and the performance of labor necessary for the Project and submissions should be marked as follows:

Miami County Commissioner's Hearing Room Renovation

201 West Main Street
Troy, Ohio, 45373

All in accordance with the Scope of Work Documents prepared by Levin Porter Architects. Stipulated Sum bids for the single Prime Bid Package. **Estimated value = \$585,000.00**

A pre-bid meeting will be held at **9:00AM on WEDNESDAY, JANUARY 14TH, 2026** at the project site. The pre-bid meeting is not mandatory, but bidders are strongly encouraged to attend.

A Bid Security in the form of a certified check, cashier's check, irrevocable letter of credit, or surety company bond pursuant to Chapter 1305 of the Ohio Revised code in the amount of 10% of the total bid shall accompany each bid; or a bid guaranty bond in accordance with Section 153.54 of the Ohio Revised Code in the amount of 100% of the total bid shall accompany each bid.

Successful Bidder shall pay all workers on this Project at State of Ohio Prevailing Wage Rates and comply with all related reporting requirements.

Scope of Work will be available to download from the Miami County Website. Email your request to bhowlett@miamicountyohio.gov and a link will be sent with downloading instructions.

Each bid must be submitted in duplicate on a blank form furnished by the Board, in a sealed envelope. Mark plainly on the outside of the envelope, the project you are bidding on. No bidder may withdraw their bid for a period of sixty (60) days after the bid opening

The Board reserves the right to reject any or all bids and to waive informalities, irregularities and/or errors in the bids to the extent permitted by law. This includes the right to extend the date and time for receipt of bids.

This notice is posted on the Board of Miami County Commissioners website. Notice can be accessed at: www.miamicountyohio.gov.

The Date of this notice: SUNDAY, JANUARY 4, 2026

By: Board of Miami County Commissioners
Miami County Hobart Exterior Improvements
201 W Main Street
Troy, Ohio 45373

Ted S. Mercer, President
By: Janelle S. Barga, Clerk

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GENERAL SPECIFICATIONS

1. INSTRUCTIONS TO BIDDERS

- A. The bidder shall carefully read and examine the Notice to Bidders, bidder's proposals, general information for bidders and drawings, the proposed contract, and visit and inspect the construction site. The successful bidder shall execute the proposed contract upon award.
- B. Should any bidder discover discrepancies, ambiguities, or omissions with respect to these specifications, or should he be in doubt as to their meaning, he shall at once notify the Board of Miami County Commissioners (937-440-5910), who will, if deemed necessary, notify all bidders.
- C. Bids will be received, publicly opened, and read aloud at the place, date and time named in the "Notice to Bidders".
- D. Each Bidder shall submit **three (3)** copies of its bid proposal. All bids must be on the Bid proposal form contained in the Miami County Commissioner's Hearing Room Renovation Project Manual and shall be submitted in a sealed opaque envelope clearly marked with the bidder's name and address and the "**MIAMI COUNTY COMMISSIONER'S HEARING ROOM RENOVATION**"

2. BID BOND

Each bid must contain the name of every interested party in the organization and pursuant to Section 153.54 of the Ohio Revised Code the bidder shall submit a bid guaranty as a guarantee that the bidder, if successful, will enter into a contract with the Board of Miami County Commissioners. The bid guaranty shall be in the form of either:

- A. A bond in accordance with Section 153.54 (B) of the Ohio Revised Code for the full amount of the bid. The bond shall be retained for the ~~s u c c e s s f u l~~ bidder, and returned to each unsuccessful bidder after the contract is executed. The form of this bond shall be in accordance with 153.571 of the Ohio Revised Code. (Bond form is enclosed)
- B. A certified check, cashier's check, or letter of credit (Chapter 1305 of the Ohio Revised Code) in accordance with Section 153.54 (C) of the Ohio Revised Code in an amount equal to 10% of the total bid. The certified check, cashier's check, or letter of credit will be returned to all bidders when the contract is executed and a performance bond compliant with R.C. Sections 153.54(C) and 153.571 have been provided by the Successful Bidder.

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3. PERFORMANCE BOND

The successful bidder shall furnish to the Board of Miami County Commissioners a performance bond or a bid guaranty in the amount of 100% of the bid to provide for the completion of the contract, with an additional obligation for the payment by the contractor, and by all subcontractors for all labor performed or materials and tools furnished and for the use of repairs to equipment used in connection with the contract. The form of the bond shall be as follows:

- A. If a 100% bond according to Section 153.54 (B) of the Ohio Revised Code is submitted with the bid, the successful bidder's bond shall be as stated in Section 153.571 of the Ohio Revised Code.
- B. If a certified check, cashier's check, or letter of credit in accordance with Section 153.54 (C) of the Ohio Revised Code in the amount equal to 10% of the bid is submitted with the bid, the successful bidder shall file a performance bond for the amount of the contract. The form of the performance bond shall be as stated in Section 153.571 of the Ohio Revised Code.

4. AWARD OF CONTRACT

The Board of Miami County Commissioners will award the contract to the Bidder submitting the lowest and best bid, taking into consideration accepted alternates, in their sole determination. However, the Board reserves the right to reject any or all bids, and, if in the interest of Miami County to do so, waive any defects or irregularities in bid proposals. In making an award pursuant thereto, the Board of Miami County Commissioners will be governed by the applicable provisions of the Ohio Revised Code.

5. ALTERNATES

The Board of Miami County Commissioners (hereinafter "Owner") may request bids on alternates. If the Owner requests bids on alternates, the Bidder should include the cost of the alternates requested on its Bid Form.

At the time of awarding the contract, the Owner will select or reject alternates as it determines is in its best interest. A Bidder's failure to include on its Bid Form the cost of an alternate selected by the Owner and applicable to the Bidder's work shall render the bid non-responsive and be grounds for rejection of the bid. Otherwise, the failure to include the cost of an alternate will not be deemed material.

The Bidder acknowledges that although there is an estimate for the cost of the Project, the market conditions may, and frequently do, result in the estimate being different from the sum of the bids received, either higher or lower. The Bidder understands that the Owner may include alternates, which may include deduct alternates as well as add alternates, to give it flexibility to build the Project with the funds available. The Bidder

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Further understands the and acknowledges that use of add and deduct alternates is a long held customary practice in the construction industry in the State of Ohio. The Bidder also acknowledges that the Owner will not make a decision about the alternates on which to base the award of contracts until the bids are received, and the Owner can compare its available funds with the base bids and the cost or savings from selecting different alternates. The Bidder understands that the award to the Bidder submitting the lowest and best bid will be based on the lowest base bid plus selected alternates, and may result in an award to a Bidder other than the Bidder that submitted the lowest base bid.

If, during the progress of the Project, the Owner desires to reinstate any alternate not included in the Contract, the Owner reserves the right to reinstate the alternate at the price bid by the Contractor provided that such action is taken in sufficient time so as not to delay the progress of the work or cause the Contractor additional expense.

6. OWNER'S RIGHT TO WAIVE DEFECTS AND IRREGULARITIES

The Owner reserves the right to waive any, and all, defects and irregularities in any bid, provided that the defects and irregularities do not affect the amount of the bid in any material respect or otherwise give the Bidder a competitive advantage.

7. MODIFICATION/WITHDRAWAL OF BIDS

A. Modification. A Bidder may modify its bid by written communication to the Owner at any time prior to the scheduled closing time for receipt and opening of bids, provided such written communication is received by the Owner prior to the bid deadline. The modification shall be submitted in a sealed opaque envelope format and must arrive prior to the bid opening time to be accepted. The written communication shall not reveal the bid price, but should provide the addition or subtraction or other modification so that the final prices or terms will not be known until the sealed bid is opened as well. If the Bidder's written instructions with the change in bid reveal the bid amount in any way prior to the bid opening, the bid may be rejected as non-responsive.

B. Withdrawal Prior to Bid Deadline. A Bidder may withdraw its bid at any time for any reason prior to the bid deadline for the opening of bids established in the Request for Bids. The request to withdraw shall be made in writing to, and received by, the Owner prior to the time of the bid opening.

C. Withdrawal after Bid Deadline.

- a. All bids shall remain valid and open for acceptance for a period of at least 60 days after the bid opening; provided, however, that a Bidder may withdraw its bid from consideration after the bid deadline when all of the following apply:
 - (1) the price bid was substantially lower than the other bids;

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- (2) the reason for the bid being substantially lower was a clerical mistake, rather than a mistake in judgment, and was due to an unintentional and substantial error in arithmetic or an unintentional omission of a substantial quantity of work, labor, or material ;
- (3) the bid was submitted in good faith; and
- (4) the Bidder provides written notice to the Owner, to the attention of the Owner's Representative, within two (2) business days after the bid opening for which the right to withdraw is claimed.

- b. No bid may be withdrawn under this provision if the result would be the awarding of the contract on another bid for the bid package from which the Bidder is withdrawing its bid to the same Bidder.
- c. If a bid is withdrawn under this provision, the Owner may award the Contract to another Bidder determined by the Owner to be the lowest and best bidder or the Owner may reject all bids and advertise for other bids. In the event the Owner advertises for other bids, the withdrawing Bidder shall pay the costs incurred in connection with the rebidding by the Owner, including the cost of printing new Bid Documents, required advertising, and printing and mailing notices to prospective bidders, if the Owner finds that such costs would not have been incurred but for such withdrawal.

8. COMPLIANCE WITH APPLICABLE LAWS

- 1. By submitting a bid for Work on the Project, the Bidder acknowledges that it is in compliance with applicable federal, state, and local laws and regulations, including, but not limited to, the following:
 - a. Equal Employment Opportunity/Nondiscrimination. The Bidder agrees that if it is awarded a contract that in the hiring of employees for performance of work under the contract or any subcontract, neither it nor any subcontractor, or any person acting on its behalf or its subcontractor's behalf, by reason of race, creed, sex, disability as defined in Section 4112.01 of the Ohio Revised Code, color, religion or military status shall discriminate against any citizen of the state in the employment of labor or workers who are qualified and available to perform work to which the employment relates. The Bidder further agrees that neither it nor any subcontractor or any person on its behalf or on behalf of any subcontractor, in any manner, shall discriminate against or intimidate any employees hired for the performance of the work under the contract on account of race, creed, sex, disability as defined in Section 4112.01 of the Ohio Revised Code, color, religion or military status.
 - b. Ethics Laws. The Bidder represents that it is familiar with all applicable ethics law requirements, including without limitation Sections 102.04 and 3517.13 of the Ohio Revised Code, and certifies that it is in compliance with such requirements.

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9. LIQUIDATED DAMAGES

If the Contractor fails to achieve the Contract Time, it would be difficult, if not impossible, to determine the Owner's resulting damages. Therefore, if the Contractor fails to achieve the Contract Time, the Contractor shall (at the Owner's option) pay to or credit the Owner the Liquidated Damages sum of \$500 for each calendar day that the Contractor fails to achieve the Contract Time.

10. COMPLIANCE WITH SECTION 3517.13 OF THE OHIO REVISED CODE

The bidder must submit the affidavit included in this bid packet with his bid proposal; which certifies that he is in conformance with the Ohio Revised Code as follows: Sections 3517.13(I)(3) and 3517.13(J)(3) require that no agency or department of this state or any political subdivision shall enter into any contract for the purchase of goods or services with a cost aggregating more than \$10,000 dollars in a calendar year with a corporation, individual, partnership, or other unincorporated business, association, including, without limitation, a professional association organized under Chapter 1785 of the Revised Code, estate, or trust unless the contract includes a certification that the individuals named in Revised Code Sections 3517.13(I)(1) and 3517.13(J)(1) are in compliance with the aforementioned provisions.

11. FINDINGS FOR RECOVERY

By submitting its bid, each Bidder certifies for reliance of the Board that it has no unresolved finding for recovery against it issued by the Auditor of the State of Ohio on or after January 1, 2001, except as permitted by Section 9.24 (F) of the Ohio Revised Code.

12. EXCLUDED PARTIES LIST

By submitting its bid, each Bidder certifies that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

13. BID SUBMISSION

All bids must be received prior to the opening date and time as stated in the notice to bidders. All bids must include the following:

- a. Bid Form
- b. Contractor Qualification Statement
- c. Contractor's Certification of Insurance
- d. Non-Collusion Affidavit
- e. Bid Guaranty and if applicable, Contract Bond
- f. Certification of Compliance with Section 3517.13 of the Ohio Revised Code
- g. Certification of Compliance with Non-Discrimination Law

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PROJECT SPECIFICATIONS

1. GENERAL REQUIREMENTS

1.1 SCOPE OF WORK

The work includes all labor to renovate the Commissioner's existing Hearing Room and the adjacent Administrative office areas adjacent to it, as denoted in the Project Documents. This scope shall include architectural, mechanical, electrical, plumbing and technology improvements and updates. The contractor shall be responsible for all aspects of delegated design systems, procurement, permitting, installation, and final inspection of the Project.

1.2 CODES AND STANDARDS

All work shall conform to applicable local, state, and federal regulations, as well as the following standards:

- Current version of Ohio Building Code (OBC)
- Current version of the National Electrical Code (NEC)
- Any other Local, State and Federal Regulations

1.3 CONTRACTOR RESPONSIBILITIES

- Provide all necessary permitting, labor, materials, equipment, and supervision.
- Provided delegated design services where identified in the Documents.
- Use temporary barriers or fencing as required to prevent unauthorized access to work areas.
- Apply and submit for all required permits and approvals from local authorities.
- Provide submittals to Miami County for review and approval prior to installation.
- Adhere to all local, state, and federal regulations, including electrical codes and safety standards.
- Coordinate work schedules with Miami County to minimize disruptions.
- Conduct a final walkthrough and inspection with Miami County representatives to ensure compliance with project requirements.

1.4 SUBMITTALS

The contractor shall submit the following for approval:

- Product data sheets for all materials
- Work schedule and sequencing plan
- Provide a complete Project schedule within two (2) weeks of contract award
- Warranty information for all installed products and workmanship.
- Other requirements as outlined in the Project Documents.

2. EXISTING CONDITIONS

2.1 EXISTING BUILDING

- Remove existing building elements as outlined in the Drawings.
- Salvage identified items and either store for reuse or turn over to the Owner as indicated.
- Protect existing construction to remain.
- Refer to Project Specifications for additional Project Requirements.

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BID FORM

DATE: _____

SUBMITTED BY: _____ **(Name of Bidder)**

To:

Board of Miami County Commissioners
201 West Main Street
Troy, Ohio 45373

We, the undersigned having familiarized ourselves with the local conditions affecting the cost of work and with the written scope of work, hereby purpose to furnish all labor, equipment, utilities, permits and transportation to furnish and deliver all materials, and to perform and supervise all work required for the project entitled:

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BASE BID-ITEM# 1- RENOVATION OF HEARING ROOM AND ADJACENT ADMINISTRATIVE AREA

QUOTE TO PROVIDE WORK DESCRIBED ABOVE FOR ITEM 1:

_____ Dollars (sum in words)
\$ _____

EXHIBITS

- Project Manual
- Project Drawings

ACKNOWLEDGEMENT OF ADDENDA (Sign line below)

Addendum One : _____ Date: _____
: _____ Date: _____
: _____ Date: _____
: _____ Date: _____

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ESTIMATED COST OF PROJECT

\$585,000.00

SIGNATURE PAGE

FIRM NAME: _____

BY: _____

TITLE: _____

OFFICAL ADDRESS: _____

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BID GUARANTY AND CONTRACT BOND

(SECTION 153.571 Ohio Revised Code)

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned

(Name and Address)

as Principal and _____

(Name of Surety)

as Surety, are hereby held and firmly bound unto _____

as Obligee in the penal sum of the dollar amount of _____

the bid submitted by the Principal to the Obligee on _____ to undertake the project known as: Miami County Commissioner's Hearing Room Renovation

The penal sum referred to herein shall be the dollar amount of the Principal's bid to the Obligee, incorporating any additive or deductive alternate proposals made by the Principal on the date referred to above to the Obligee, which are accepted by the Obligee. In no case shall the penal sum exceed the amount of _____

_____ dollars (______). (If the above line is not filled in,

the penal sum will be the full amount of the Principal's bid, including alternates. Alternatively, if the blank is filled in, the amount stated must not be less than the full amount of the bid, including alternates, in dollars and cents. A percentage is not acceptable.) For the payment of the penal sum well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that whereas the above named Principal has submitted a bid on the above referenced project;

NOW, THEREFORE, if the Obligee accepts the bid of the Principal and the Principal fails to enter into a proper contract in accordance with the bid, plans, details, specifications, and bills of material; and in the event the Principal pays to the Obligee the difference not to exceed ten percent of the penalty hereof between the amount specified in the bid and such larger amount for which the Obligee may in good faith contract with the next lowest bidder to perform the work covered by the bid; or in the event the Obligee does not award the contract to the next lowest bidder and resubmits the project for bidding, the Principal pays to the Obligee the difference not to exceed ten percent of the penalty hereof between the amount specified in the bid, or the costs, in connection with the resubmission, of printing new contract documents, required advertising and printing and mailing notices to prospective bidders, whichever is less, then this obligation shall be null and void, otherwise to remain in full force and effect; if the Obligee accepts the bid of the Principal and the Principal within ten days after the awarding of the contract, enters into a proper contract in accordance with

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the bid, plans, details, specifications, and bills of material, which said contract is made a part of this bond the same as though set forth herein; and

IF THE SAID Principal shall well and faithfully do and perform each and every condition of such contract; and indemnify the Obligee against all damage suffered by failure to perform such contract according to the provisions thereof and in accordance with the plans, details, specifications, and bills of material therefore; and shall pay all lawful claims of subcontractors, materialmen, and laborers, for labor performed and materials furnished in the carrying forward, performing, or completing of said contract; we agreeing and assenting that this undertaking shall be for the benefit of any materialman or laborer having a just claim; as well as for the Obligee herein; then this obligation shall be void; otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

THE SAID Surety hereby stipulates and agrees that no modifications, omission, or additions, in or to the terms of the said contract or in or to the plans or specifications therefor shall in any wise affect the obligations of said Surety on its bond, and it does hereby waive notice of any such modifications, omissions or additions to the terms of the contract or to the work or to the specifications.

SIGNED AND SEALED this _____ day of _____, _____

PRINCIPAL: _____

By: _____

Title:

SURETY:

By: _____

Attorney-in-Fact

SURETY COMPANY ADDRESS:

Street

Telephone

SURETY AGENT'S ADDRESS

Agency Name

Street

City _____ State _____ Zip _____

Tables

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CONTRACTOR QUALIFICATION STATEMENT QUESTIONNAIRE

I. GENERAL INFORMATION

Legal Business Name:

Business Address:

Phone Number:

Email Address:

Type of Business Entity (Corporation, Partnership, Sole Proprietorship, LLC, etc.):

Year Established:

Federal Employer Identification Number (EIN):

State of Incorporation:

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Names of Principal Officers, Partners, or Owners:

II. EXPERIENCE & CAPABILITIES

12. List the types of services your company provides:

13. How many years of experience does your company have in providing these services?

14. Provide a brief company history and description of capabilities:

15. Has your company worked on government or public sector projects before? If so, please list relevant projects:

16. Provide at least three project references, including project name, scope, contract amount, and client contact information:

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III. LICENSING & INSURANCE

17. List all relevant licenses and certifications your company holds:

18. Do you have bonding capacity? If yes, provide details including bonding company and limits:

19. List your insurance coverage, including general liability, workers' compensation, and any other relevant policies (attach copies of certificates of insurance):

IV. FINANCIAL INFORMATION

20. Provide the name and contact information of your company's primary bank:

21. Has your company ever filed for bankruptcy? If so, explain:

22. Are there any liens or legal claims currently filed against your company? If yes, explain:

23. Provide a recent financial statement or balance sheet (if requested):

V. SAFETY & COMPLIANCE

24. Do you have a written safety program? (Attach copy if available):

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25. Have you had any OSHA citations in the past five years? If yes, explain:

26. Does your company conduct regular safety training for employees?

VI. LEGAL & PERFORMANCE HISTORY

27. Has your company ever failed to complete a contract? If yes, explain:

28. Has your company been involved in any lawsuits or arbitration related to contract performance? If yes, explain:

29. Have any of your company's key personnel been convicted of a crime related to contracting or fraud? If yes, explain:

30. List any debarments or suspensions from government contracts:

VII. ADDITIONAL INFORMATION

31. Provide any additional information that may be relevant to your company's qualifications:

32. Attach any supporting documents, such as company brochures, letters of recommendation, or certifications:

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CERTIFICATION & SIGNATURE

I certify that the information provided in this questionnaire is true and complete to the best of my knowledge.

Signature: _____ Name: _____

Title: _____ Date: _____

CONTRACTOR'S CERTIFICATE OF INSURANCE

This Certificate of Insurance is issued as of the _____ day of _____, 20____, and serves to certify that the below-named Contractor carries the required insurance coverage as specified in the contract agreement.

Contractor Information:

Contractor Name: _____
Company Name: _____
Address: _____
City, State, ZIP: _____
Phone Number: _____
Email Address: _____

Project Details:

Project Name: _____
Project Location: _____
Contract Number: _____
Owner/Client: _____

Insurance Coverage

The Contractor certifies that they have obtained and maintain the following insurance policies with coverage not less than the amounts specified:

General Liability Insurance

Insurance Provider: _____

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Policy Number: _____

Coverage Limits: \$ _____

Effective Date: _____ Expiration Date: _____

Workers' Compensation Insurance

Insurance Provider: _____

Policy Number: _____

Coverage Limits: Statutory Limits

Effective Date: _____ Expiration Date: _____

Automobile Liability Insurance

Insurance Provider: _____

Policy Number: _____

Coverage Limits: \$ _____

Effective Date: _____ Expiration Date: _____

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Professional Liability Insurance (if applicable)

Insurance Provider: _____

Policy Number: _____

Coverage Limits: \$ _____

Effective Date: _____ Expiration Date: _____

Authorized Representative:

I certify that the above insurance coverages are in full force and effect as of the date of issuance.

Authorized Representative Name

Authorized Representative Signature

Insurance Provider or Broker Company

Date:

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NON-COLLUSION AFFIDAVIT

State of Ohio

BID Identification: _____

CONTRACTOR _____,

being first duly sworn, deposes and says that he is _____

(sole owner, a partner, president, secretary, etc.) of _____, the making the foregoing BID; that such BID is not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization, or corporation; that such BID is genuine and not collusive or sham; that said BIDDING VENDOR has not directly or indirectly induced or solicited any other BIDDING VENDOR to put in a false or sham BID, and has not directly or indirectly colluded, conspired, connived, or agreed with any BIDDING VENDOR or any one else to put in a sham BID, or that any one shall refrain from offering a Bid; that said BIDDING VENDOR has not in any manner, directly or indirectly, sought by agreement, communication or conference with anyone to fix the BID price of said BIDDING VENDOR or of any other BIDDING VENDOR, or fix any overhead, profit or cost element of such BID price, or that of any other BIDDING VENDOR, or to secure any advantage against Miami County awarding the contract or anyone interested in the proposed contract; that all statements contained in such BID are true; and, further, that said BIDDING VENDOR has not, directly or indirectly, submitted his BID price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid and will not pay any fee in connection therewith, to any corporation, partnership, company, association, organization, BID depository, or to any member or agent thereof, or to any other individual except to such person or persons as have a partnership or other financial interest with said BIDDING VENDOR in his general business.

Signed: _____

Subscribed and sworn to before me this _____ day of _____, 20____.

Seal of Notary

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CERTIFICATION OF COMPLIANCE WITH ORC SECTION 3517.13

Miami County (the "Subdivision") has entered into a contract for the provision of goods and/or services with _____ (the "Provider"), an individual, partnership, unincorporated business, an association, a professional association, estate, trust, corporation, or business trust, the situs of the principal office and place of operations of which is located at _____. The undersigned authorized agent of the Provider certifies on behalf of the Provider that all of the following persons, if applicable, are in compliance with Divisions (I) and (J) of Section 3517.13 of the Ohio Revised Code with respect to all public officials who have or had authority to award that contract and all public officials who may authorize or receive goods and/or services under that contract:

- A. Myself;
- B. Each partner or owner of the partnership or association;
- C. Each shareholder of the association;
- D. Each executor or administrator of the estate;
- E. Each trustee of the trust;
- F. Each owner of more than twenty percent (20%) of the corporation or business trust;
- G. Each spouse of any of the above listed persons;
- H. Each child, between seven (7) and seventeen (17) years of age, of any of the above listed persons;
- I. Any political action committee associated with the partnership, the unincorporated business, the estate, the trust, the corporation, or the business trust; and,
- J. Any combination of the persons and entities identified in (A) through (I) above.

The undersigned certifies such compliance on and since _____ (and on the date the Subdivision and the Provider entered into the Contract referenced above if it has not been entered into fully by them). This certification shall be a part of the above-referenced Contract between the Subdivision and the Provider.

By: _____

AUTHORIZED REPRESENTATIVE

Date Signed: _____

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WARNING

By signing this Certification of Compliance with Ohio Revised Code Section 3517.13, you are making a representation as to the truth of the statements contained herein. Making a false certification is a felony crime punishable by up to eighteen months in prison, and/or up to \$2,500.00 for an individual or \$7,500.00 for an organization. R.C. § 3517.992(R)(3).

THIS DOCUMENT SHOULD BE RETAINED FOR RECORD PURPOSES.

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CERTIFICATE OF COMPLIANCE WITH NON-DISCRIMINATION LAWS

_____ (hereinafter "Contractor") hereby states that during the term of the

_____ Project (hereinafter "Project"), the Contractor and any sub-Contractor shall not discriminate against any employee or qualified applicant for employment who is both available and qualified for work because of age, race, color, religion, sex, disability, creed, national origin or military status. Contractor and any sub-Contractor shall not discriminate based upon age, race, color, religion, sex, disability, creed, national origin or military status in any undertaking related to employment including (but not limited to) such actions as hiring, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

Contractor: _____

By (Signature) _____ Date: _____

Printed Name _____

Title _____

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COMPLIANCE WITH OHIO PREVAILING WAGE (ORC 4115)

- A. Successful Bidder shall pay the prevailing rate of wages as shown in the wage rate schedules issued by the Ohio Department of Commerce, Division of Industrial Compliance and Labor, Bureau of Wage and Hour Administration, for the classification of work being performed.
 - o Wage rate schedules include all modifications, corrections, escalations, or reductions to wage rates issued for the project.
 - o Overtime must be paid at time and one-half the employee's base hourly rate. Fringe benefits are paid at straight time rate for all hours including overtime.
 - o Prevailing wages must be paid in full without any deduction for food, lodging, transportation, use of tools, etc.; unless, the employee has voluntarily consented to these deductions in writing. The public authority and the Director of Ohio Department of Commerce, Division of Industrial Compliance and Labor, Bureau of Wage and Hour Administration - must approve these deductions as fair and reasonable. Consent and approval must be obtained before starting the project.
- B. Use of Apprentices and Helpers cannot exceed the ratios permitted in the wage rate schedules.
 - o Apprentices must be registered with the U.S. Department of Labor Bureau of Apprenticeship and Training.
 - o Contractors must provide the Prevailing Wage Coordinator a copy of the Apprenticeship Agreement for each apprentice on the project.
- C. Keep full and accurate payroll records available for inspection by any authorized representative of the Ohio Department of Commerce, Division of Industrial Compliance, and Labor, Bureau of Wage and Hour Administration or the contracting public authority, including the Prevailing Wage Coordinator. Records should include but are not limited to:
 - o Time cards, time sheets, daily work records, etc.
 - o Payroll ledger\journals and canceled checks\check register.
 - o Fringe benefit records must include program, address, account number, & canceled checks.
 - o Records made in connection with the public improvement must not be removed from the State for one year following the completion of the project.
 - o Out-of-State Corporations must submit to the Ohio Secretary of State the full name and address of their Statutory Agent in Ohio.
- D. Prevailing Wage Rate Schedule must be posted on the job site where it is accessible to all employees.
- E. Prior to submitting the initial payroll report, supply the Prevailing Wage Coordinator with your project dates to schedule reporting of your payrolls.
- F. Supply the Prevailing Wage Coordinator a list of all subcontractors including the name, address, and telephone number for each.
 - o Contractors are responsible for their subcontractors' compliance with requirements of Chapter 4115 of the Ohio Revised Code.
- G. Before employees start work on the project, supply them with written notification of their job classification, prevailing wage rate, fringe benefit amounts, and the name of the Prevailing Wage Coordinator for the project. A copy of the completed signed notification should be submitted to Prevailing Wage Coordinator.
- H. Supply all subcontractors with the Prevailing Wage Rates and changes.
- I. Submit certified payrolls within two (2) weeks after the initial pay period. Payrolls must include the following information:
 - o Employees' names, addresses, and social security numbers.
 - a. Corporate officers/owners/partners and any salaried personnel who do physical work on the project are considered employees. All rate and reporting requirements are applicable to these individuals.

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- Employees' work classification.
 - a. Be specific about the laborers and/or operators (Group)
 - b. For all apprentices, show level/year and percent of journeyman's rate
- Hours worked on the project for each employee.
 - a. The number of hours worked in each day and the total number of hours worked each week.
- Hourly rate for each employee.
 - a. The minimum rate paid must be the wage rate for the appropriate classification. The Department's Wage Rate Schedule sets this rate.
 - b. All overtime worked is to be paid at time and one-half for all hours worked more than forty (40) per week.
- Where fringes are paid into a bona fide plan instead of cash, list each benefit and amount per hour paid to program for each employee.
 - a. When the amount contributed to the fringe benefit plan and the total number of hours worked by the employee on all projects for the year are documented, the hourly amount is calculated by dividing the total contribution of the employer by the total number of hours worked by the employee.
 - b. When the amount contributed to the fringe benefit is documented but not the total hours worked, the hourly amount is calculated by dividing the total yearly contribution by 2080.
- Gross amount earned on all projects during the pay period.
- Total deductions from employee's wages.
- Net amount paid.

J. The reports shall be certified by the contractor, subcontractor, or duly appointed agent stating that the payroll is correct and complete; and that the wage rates shown are not less than those required by the O.R.C. 4115.

K. Provide a Final Affidavit to the Prevailing Wage Coordinator upon the completion of the project.

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AFFIDAVIT OF COMPLIANCE WITH PREVAILING
WAGE



Department
of Commerce

Division of Industrial Compliance

I,

(Name of person signing affidavit) (Title)

do hereby certify that the wages paid to all employees of

(Company Name)

for all hours worked on the

(Project name and location)

project, during the period from _____ to _____ are in
(Project Dates)

compliance with prevailing wage requirements of Chapter 4115 of the Ohio Revised Code. I further certify that no rebates or deductions have been or will be made, directly or indirectly, from any wages paid in connection with this project, other than those provided by law.

(Signature of Officer or Agent)

Sworn to and subscribed in my presence this _____ day of _____, 20 _____.

(Notary Public)

The above affidavit must be executed and sworn to by the officer or agent of the contractor or subcontractor who supervises the payment of employees. This affidavit must be submitted to the owner (public authority) before the surety is released or final payment due under the terms of the contract is made.

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OHIO PREVAILING WAGE RATES

Link to Miami County PWR Rates:

<https://wagehour.com.ohio.gov/w3/webwh.nsf/QueryWageRateAll?OpenAgent&PClassification=Select- &PCounty=MIAMI&PUnion=Select->



The screenshot shows the Ohio Department of Commerce website. The header features the "Ohio.gov" logo with the tagline "Be much to Discover" and the text "Ohio Department of Commerce" and "Bureau of Wage & Hour Administration". Below the header are navigation links for "forms", "contacts", "about LAWS", and "search". The main menu includes "Consumers", "Business", "License/Permit Holders & Applicants", and "Other Government Agencies".

[Back to wage rate search](#) [Back to Home](#)

Classification = All, County = MIAMI, Union = All

County	Classification	Effective	Posted	Union
MIAMI	Asbestos Worker	7/24/2024	7/24/2024	Asbestos Local 207
MIAMI	Asbestos Worker	10/30/2024	10/30/2024	Asbestos Local 50 Heat & Frost Insulators
MIAMI	Boilermaker	10/1/2013	9/25/2013	Boilermaker Local 105
MIAMI	Bricklayer	5/5/2024	5/5/2024	Bricklayer Local 23 Heavy Hwy (A)
MIAMI	Bricklayer	5/5/2024	5/5/2024	Bricklayer Local 23 Heavy Hwy (B)
MIAMI	Bricklayer	7/1/2024	6/26/2024	Bricklayer Local 23 (Dayton Tile Finisher)
MIAMI	Bricklayer	7/1/2024	6/26/2024	Bricklayer Local 23 (Dayton Tile Mechanic)
MIAMI	Bricklayer	6/5/2024	6/5/2024	Bricklayer Local 23 (Dayton)
MIAMI	Carpenter	2/19/2025	2/19/2025	Carpenter Floorlayer SW District G
MIAMI	Carpenter	10/2/2024	10/2/2024	Carpenter Millwright Local 1090 SW Zone II
MIAMI	Carpenter	5/3/2024	5/3/2024	Carpenter & Pile Driver SW District Hwy/Hwy
MIAMI	Carpenter	7/31/2024	7/31/2024	Carpenter & Pile Driver SW Zone 1
MIAMI	Cement	5/1/2024	5/29/2024	Cement Mason Local 132 (Dayton)
MIAMI	Cement Mason	5/1/2024	5/1/2024	Cement Mason Statewide Hwy/Hwy
MIAMI	Lineman	2/7/2024	2/7/2024	Electrical Local 71 DOT Traffic Signal Highway Lighting
MIAMI	Lineman	1/6/2025	1/23/2024	Electrical Local 71 High Tension Pipe Type Cable
MIAMI	Lineman	1/6/2025	1/23/2024	Electrical Local 71 Outside Utility Power
MIAMI	Lineman	1/6/2025	1/23/2024	Electrical Local 71 Underground Residential Distribution
MIAMI	Voice, Data, Video	3/6/2024	3/6/2024	Electrical Local 71 Voice, Data, Video Outside
MIAMI	Electrical	12/2/2024	11/27/2024	Electrical Local 82 Inside
MIAMI	Electrical	10/30/2024	10/30/2024	Electrical Local 82 Inside LT Commercial South West
MIAMI	Electrical	12/6/2022	11/23/2022	Electrical Local 82 Lighting Rod
MIAMI	Voice, Data, Video	11/27/2024	11/27/2024	Electrical Local 82 Voice, Data, Video
MIAMI	Elevator	1/23/2025	1/23/2025	Elevator Local 11
MIAMI	Glazier	11/1/2024	10/30/2024	Glazier Local 387
MIAMI	Ironworker	6/5/2024	6/5/2024	Ironworker Local 290
MIAMI	Laborer Group 1	5/1/2024	5/1/2024	Labor Hwy/Hwy 3
MIAMI	Laborer	7/31/2024	7/31/2024	Labor Local 1410 Building
MIAMI	Operating Engineer	6/5/2024	6/5/2024	Operating Engineers - Building Local 18 - Zone III
MIAMI	Operating Engineer	6/5/2024	6/5/2024	Operating Engineers - Hwy/Hwy Zone II
MIAMI	Drywall Finisher	5/29/2024	5/29/2024	Painter Local 249
MIAMI	Painter	5/29/2024	5/29/2024	Painter Local 249
MIAMI	Painter	5/29/2024	5/29/2024	Painter Local 249 Hwy/Hwy
MIAMI	Painter	6/10/2015	6/10/2015	Painter Local 634
MIAMI	Painter	3/2/2023	3/2/2023	Painter Local 639 Zone 2 Sign
MIAMI	Plaster	5/29/2024	5/29/2024	Plasterer Local 132 (Dayton)
MIAMI	Plumber/Pipefitter	8/30/2023	8/30/2023	Plumber Pipefitter Local 162
MIAMI	Rooter	12/24/2024	12/24/2024	Rooter Local 75
MIAMI	Sheet Metal Worker	9/18/2024	9/18/2024	Sheet Metal Local 24 (Dayton)
MIAMI	Sprinkler Fitter	1/1/2025	1/31/2024	Sprinkler Fitter Local 669
MIAMI	Truck Driver	5/1/2024	5/1/2024	Truck Driver Locals 20,40,92,92b,100,175,284,438,377,637,908,957 - Bldg & Hwy/Hwy Class 1
MIAMI	Truck Driver	5/1/2024	5/1/2024	Truck Driver Locals 20,40,92,92b,100,175,284,438,377,637,908,957 - Bldg & Hwy/Hwy Class 2
MIAMI	Truck Driver	5/1/2024	5/1/2024	Truck Driver Locals 20,40,92,92b,100,175,284,438,377,637,908,957 - Bldg & Hwy/Hwy Class 3

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CERTIFIED PAYROLL REPORT

CERTIFIED PAYROLL REPORT

Date _____ My signature on this form signifies that I pay, or supervise the payment of the employees shown above. I am certifying: 1) That during the pay period reported on this form, all hours worked on this project have been paid at the appropriate prevailing wage rate for the class of work done. 2) That the fringe benefits have been paid as indicated above. 3) That no rebates or deductions have been or will be made, directly or indirectly from the total wages earned, other than permissible deductions as defined in the Ohio Revised Code Chapter 4115. 4) That apprentices are registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training. The willful falsification of any of the above statements may subject the contractor or subcontractor to civil or criminal prosecution.

Name and Title

Signature

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SAMPLE CONTRACT

CONTRACT FOR [PROJECT NAME]

This "CONTRACT FOR [PROJECT NAME]" ("Contract") is entered into by and between the Board of Miami County Commissioners ("Board"), 201 West Main Street, Troy, Ohio 45373 and [CONTRACTOR] ("Contractor"), with business address [ADDRESS], pursuant to law.

NOW, THEREFORE, in consideration of the mutual promises herein contained, the Board and Contractor agree as follows:

1. Term The term of this Contract shall commence on the date this Contract is executed by the Board and shall terminate on the [DATE] or upon completion of the Work, whichever comes first. This Contract may be terminated by the Board for any or no reason upon delivery by first class U.S. mail, postage prepaid, or delivery by hand, of a written "Notice of Termination" to Contractor at least seven days prior to the date of the intended early termination of this Contract.
2. Scope of Work. Pursuant to the terms and conditions set forth in this Contract and pertinent provisions of the Ohio Revised Code, the Ohio Administrative Code, federal and/or local statutes, ordinances, rules, and regulations, the Contractor shall provide all labor, equipment, materials and things necessary to perform the Work set forth and described in "[EXHIBITS]" is attached hereto and incorporated herein by reference as if fully rewritten.
 - 2.1. The Board may in its sole discretion accept or reject any portion of the Work. In the event that any portion of the Work is rejected, Contractor shall immediately correct such rejected Work to the reasonable satisfaction of the Board. The review or acceptance by the Board of any part of the Work shall not relieve Contractor of its responsibility to perform any other part of the Work pursuant to the terms and conditions of this Contract.
 - 2.2. Contractor agrees that this Contract for the provision of Work is not intended to be an exclusive Contract with the Board for the provision of the type of Work described herein.
3. Contractor Compensation. The Board shall pay the Contractor for Work performed in accordance with this Contract an amount not to exceed [WRITTEN] (\$NUMERIC). The Board shall pay the entire invoice upon completion of the Work by the Contractor and its acceptance by the Board. However, regardless of when payment is made, and notwithstanding any terms set forth on the invoice and/or any other document to the contrary, the Board shall never be obligated or

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liable to Contractor and/or any other party for any late payment or collection costs, fees or interest charges. Notwithstanding any term or condition set forth in this Contract and/or any other document to the contrary, the total monetary obligation of the Board under this Contract shall not exceed the total sum of [WRITTEN] (\$NUMERIC).

4. Duty to Indemnify The Board. The Contractor shall indemnify and hold harmless the Board, its commissioners, officers, employees and representatives from and against all claims, damages, losses, liens, causes of action, suits, judgments, and expenses (including reasonable attorney's fees and other reasonable costs of defense), of any nature, kind or description, which (a) are caused by or result from the performance of the Work by the Contractor, anyone directly or indirectly employed by the Contractor, any sub-contractor of the Contractor, or anyone for whose acts the Contractor is legally liable, and (b) are attributable to bodily injury, personal injury, sickness, disease or death of any person, or to damage to or destruction of property, but (c) only to the extent they are caused by any negligent, reckless or willful act, error or omission of the Contractor, anyone directly or indirectly employed by the Contractor, any sub-contractor of the Contractor, or anyone for whose acts the Contractor is legally liable. The terms and conditions of this paragraph 4 shall survive termination of this Contract for any reason.

4.1. In addition to its duties to indemnify the Board pursuant to paragraph 4 above, Contractor shall promptly correct, repair and/or replace any Work, items, and/or materials undertaken or installed as part of the Work and damaged and/or destroyed as a result of the fault or negligence of the Contractor, its officers, employees, sub-contractors or others engaged by Contractor in the performance of the Work. Such correction, repair and/or replacement shall be the sole responsibility of the Contractor and at the Contractor's sole expense.

5. Contractor Liability Insurance. The Contractor shall purchase and maintain liability and other insurance in such amount and under such terms as the parties may mutually agree.

5.1. Within fifteen days of the execution of this Contract by the Board, the Contractor shall without demand furnish the Board with a certified copy of any such insurance certificate required to be purchased or maintained by the Contractor.

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5.2. The Contractor shall maintain all insurance in the agreed upon amounts, without interruption, from the date of the execution of this Contract until the date of the termination of this Contract or the date of payment of the final invoice issued by Contractor, whichever is later.

5.3. Regardless of the amount of any insurance proceeds recovered by the parties under any insurance policies required to be maintained under this Contract, the Contractor shall be liable to the Board for the full amount of any claims, damages, losses, liens, causes of action, suits, judgments and expenses (including reasonable attorney's fees and other reasonable costs of defense) of any nature, kind or description which are in excess of such insurance proceeds.

6. Compliance With Law. By executing this Contract, Contractor acknowledges that it is in compliance with, and will remain in compliance with, all federal, state, municipal and/or other local laws, ordinances, resolutions, rules and regulations that govern this Contract and its performance including, without limitation, Ohio Revised Code section 3517.13.

6.1. The laws of the State of Ohio, without regard to its own "choice of law" provisions, shall govern the interpretation and construction of the terms and conditions of this Contract as well as any other claim, suit or action between the parties, whether such other claim, suit or action is based upon tort or otherwise. Any action or proceeding pertaining to this Contract or any other claim, suit or action between the parties shall be heard in a court of appropriate jurisdiction and venue located in Miami County, Ohio.

6.2. Nothing contained in this Contract is intended to be or shall be construed to create or establish the relationship of a partnership, joint venture or other business organization between the parties hereto nor to create an agency, representative or employment relationship between the Contractor or its employees and the Board. Neither the Contractor nor its employees shall be considered an employee of the Board nor shall they acquire or be entitled to any compensation, rights, benefits and/or participation of any kind whatsoever offered by the Board including, without limitation, participation in the Ohio Public Employees Retirement System, worker's compensation coverage and/or benefits, medical and hospital care, sick and vacation leave, unemployment compensation, disability, and severance pay.

6.3. Contractor agrees that during the performance of this Contract, that neither it nor any sub-contractor will discriminate against any employee or qualified applicant for

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employment who is both available and qualified for work because of age, race, color, religion, sex, disability, creed, national origin or military status. Neither the Contractor nor any sub-contractor shall discriminate based upon age, race, color, religion, sex, disability, creed, national origin, or military status, in any undertaking related to employment including (but not limited to) such actions as hiring, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, pay rates, compensation, and/or selection for training, including apprenticeship.

6.4. The Contractor and its Subcontractors, regardless of tier, shall strictly comply with their obligation to pay their employees Working on the Project site at the applicable prevailing wage rates for the type of Work, including any changes thereto, pursuant to Ohio Revised Code Chapter 4115.

7. Miscellaneous Terms. The parties each bind themselves, their successors, assigns, and legal representatives to the other party to this Contract, which represents the entire and integrated agreement between them and supersedes all prior negotiations, representations, agreements or contracts, either written or oral, between the parties.

7.1. No person or organization other than the parties hereto shall have any interest hereunder, and nothing contained herein shall be construed so as to give any person or organization other than the parties hereto any legal or equitable right, remedy or claim under or in respect to this Contract.

7.2. If any term or condition contained herein is determined by a court of competent jurisdiction to be invalid or unenforceable, such determination shall not affect the validity or enforceability of any other term or condition contained herein, each of which shall be construed and enforced to the fullest extent of the law as if such invalid or unenforceable term or condition were not contained herein. Captions or headings are for convenience only.

7.3. The parties acknowledge each of them had access to legal counsel and that each party participated materially in the negotiation and drafting of this Contract.

7.4. Neither the Board nor its commissioners, either individually or collectively, nor any Board official executing this Contract or any modification hereto shall be subject to any personal liability by reason of such execution.

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7.5. The Contractor shall not assign or transfer any right, title, or interest in this Contract without the prior written consent of the Board, which consent may be withheld by the Board for any or no reason.

7.6. This Contract may only be modified by a writing signed by the parties.

IN WITNESS WHEREOF, the parties hereto have executed this Contract on the dates set forth below.

Board of Miami County Commissioners: Date: _____

Gregory A. Simmons, Commissioner

Ted S. Mercer, Commissioner

Wade H. Westfall, Commissioner

CONTRACTOR

[CONTRACTOR] Date: _____

Name/Title Of Contractor's Authorized
Representative

Approved As to Form Only

By: _____
Miami County Prosecutor's Office

**SECTION 011000
SUMMARY****PART 1 GENERAL****1.01 PROJECT**

- A. Project Name: Miami County Commissioner's Hearing Room
- B. Owner's Name: Miami County Board of Commissioners.
- C. Architect's Name: Levin Porter Architects.
- D. The Project consists of the alteration of the existing Commissioner's Hearing Room and adjacent Administrative space as shown in the Project Drawings..

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price.

1.03 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of alterations work is indicated on drawings.
- B. Owner will remove the following items before start of work:
 - 1. Loose furnishings and equipment.
 - 2. Wall mounted artwork.
- C. Contractor is required to remove and store the following prior to start of work, for later reinstallation by Contractor:
 - 1. Flags, plaques, seals as identified in the Drawings.

1.04 WORK BY OWNER

- A. Owner will supply and install the following:
 - 1. Audio/visual equipment and wiring..
 - 2. Network equipment and wiring..
 - 3. Electronic security hardware and wiring..
 - 4. Lobby Agenda monitor and wiring..
 - 5. Personal computers and monitors.
 - 6. Duress alarm hardware and wiring
 - 7. Loose furniture
- B. Owner will supply the following for installation by Contractor:
 - 1. Breakroom microwave oven.
 - 2. Breakroom refrigerator.
 - 3. Wall mounted video monitors.

1.05 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Owner intends to occupy the Project upon Substantial Completion.
- C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- D. Schedule the Work to accommodate Owner occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings.
 - 1. Locate and conduct construction activities in ways that will limit disturbance to site.
- B. Arrange use of site and premises to allow:

1. Owner occupancy.
2. Work by Owner.
3. Use of site and premises by the public.

C. Provide access to and from site as required by law and by Owner:

1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
2. Do not obstruct roadways, sidewalks, or other public ways without permit.

D. Existing building spaces may not be used for storage.

E. Time Restrictions:

1. Limit conduct of especially noisy, malodorous, and dusty interior work to the hours of 6:00 PM until 6:00 AM.

F. Utility Outages and Shutdown:

1. Limit disruption of utility services to hours the building is unoccupied.
2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
3. Prevent accidental disruption of utility services to other facilities.

1.07 WORK SEQUENCE

- A. The Project is being structured to minimize the construction duration.
- B. The Contract will be awarded on or before February 2, 2026.
- C. Construction will commence on May 4, 2026 and must be Substantially Complete by July 3, 2026. The Contractor is free to run extended work hours, conduct work on weekends and/or perform work during overnight hours as they deem necessary.
- D. During the time between February 2, 2026 and May 4, 2026, the Contractor is expected to complete all pre-construction activities, including product shop drawing review, ordering and delivery of construction materials to ensure there are no delays during the stated construction period.
- E. Final Completion and Project Close-out are to be completed by July 17, 2026.
- F. Liquidated Damages are included in the Project and shall be applied on a daily basis for each calendar day the Substantial Completion date is exceeded at the rate of \$500.00 per day.
- G. Coordinate construction schedule and operations with Owner.

PART 2 PRODUCTS - NOT USED

END OF SECTION

SECTION 013000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. General administrative requirements.
- B. Preconstruction meeting.
- C. Progress meetings.
- D. Construction progress schedule.
- E. Coordination drawings.
- F. Submittals for review, information, and project closeout.
- G. Number of copies of submittals.
- H. Requests for Interpretation (RFI) procedures.
- I. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Section 016000 - Product Requirements: General product requirements.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 017000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
 - 1. Requests for Interpretation (RFI).
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
 - 11. Closeout submittals.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION****3.01 PRECONSTRUCTION MEETING**

- A. Architect will schedule a meeting after Notice of Award.
- B. Attendance Required:
 - 1. Owner.
 - 2. Architect.
 - 3. Contractor.
- C. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.

4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
5. Designation of personnel representing the parties to Contract and Architect.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
7. Scheduling.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required:
 1. Contractor.
 2. Owner.
 3. Architect.
 4. Contractor's superintendent.
 5. Major subcontractors.
- D. Agenda:
 1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of RFIs log and status of responses.
 7. Maintenance of progress schedule.
 8. Corrective measures to regain projected schedules.
 9. Planned progress during succeeding work period.
 10. Effect of proposed changes on progress schedule and coordination.
 11. Other business relating to work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.03 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 10 days after joint review, submit complete schedule.
- D. Submit updated schedule with each Application for Payment.

3.04 COORDINATION DRAWINGS

- A. Review drawings prior to submission to Architect.

3.05 REQUESTS FOR INTERPRETATION (RFI)

- A. Definition: A request seeking one of the following:

1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.

1. Prepare a separate RFI for each specific item.
 - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
2. Prepare in a format and with content acceptable to Owner.
3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.

1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section - 016000 - Product Requirements)
 - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
 - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
 - a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.

1. Official Project name and number, and any additional required identifiers established in Contract Documents.
2. Owner's, Architect's, and Contractor's names.
3. Discrete and consecutive RFI number, and descriptive subject/title.
4. Issue date, and requested reply date.
5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).

6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.

1. Indicate current status of every RFI. Update log promptly and on a regular basis.
2. Note dates of when each request is made, and when a response is received.
3. Highlight items requiring priority or expedited response.

H. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.

1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.

1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
2. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
3. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.06 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.

3.07 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 1. Design data.

B. Submit for Architect's knowledge as contract administrator or for Owner.

3.08 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
 1. After review, produce duplicates.
 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.09 SUBMITTAL PROCEDURES

- A. General Requirements:
 1. Use a single transmittal for related items.
 2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
 3. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
 4. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
 5. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
 - a. Deliver submittals to Architect at business address.
 6. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
 - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
 7. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
 8. Provide space for Contractor and Architect review stamps.
 9. When revised for resubmission, identify all changes made since previous submission.
 10. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
- B. Product Data Procedures:
 1. Submit only information required by individual specification sections.
 2. Collect required information into a single submittal.
 3. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
 1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
 2. Do not reproduce Contract Documents to create shop drawings.
 3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
- D. Samples Procedures:
 1. Transmit related items together as single package.

2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

3.10 SUBMITTAL REVIEW

- A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
- D. Architect's and consultants' actions on items submitted for review:
 1. Authorizing purchasing, fabrication, delivery, and installation:
 - a. "Approved", or language with same legal meaning.
 - b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
 - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
 - c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
 - 1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.
 2. Not Authorizing fabrication, delivery, and installation:
 - a. "Revise and Resubmit".
 - 1) Resubmit revised item, with review notations acknowledged and incorporated.
 - b. "Rejected".
 - 1) Submit item complying with requirements of Contract Documents.

END OF SECTION

SECTION 014000
QUALITY REQUIREMENTS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Contractor's design-related professional design services.
- E. Defect Assessment.

1.02 DEFINITIONS

- A. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.
 - 1. Design Services Types Required:
 - a. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.
 - B. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

1.03 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Base design on performance and/or design criteria indicated in individual specification sections.
- C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
 - 1. Structural Design of Metal Framing: As described in Section 054000 - Cold-Formed Metal Framing.
 - 2. Structural Design of Metal Fabrications: As described in Section 055000 - Metal Fabrications.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
 - 1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
 - 2. Include required product data and shop drawings.
 - 3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
 - 4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.06 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

PART 3 EXECUTION**2.01 CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

2.02 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements.

END OF SECTION

**SECTION 017000
EXECUTION AND CLOSEOUT REQUIREMENTS**

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Cleaning and protection.
- F. Demonstration and instruction of Owner personnel.
- G. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.02 RELATED REQUIREMENTS

- A. Section 011000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 013000 - Administrative Requirements: Submittals procedures.

1.03 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
 - 1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
 - 1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers.
 - 2. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am.

1.04 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- C. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- D. Coordinate completion and clean-up of work of separate sections.
- E. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS**2.01 PATCHING MATERIALS**

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect 5 days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 1. Review conditions of examination, preparation and installation procedures.
 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction in locations indicated on drawings.
- C. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
 - 2. Relocate items indicated on drawings.
 - 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 - 4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- D. Services (Including but not limited to HVAC, Plumbing, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - 3. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- E. Protect existing work to remain.
 - 1. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 2. Repair adjacent construction and finishes damaged during removal work.
- F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
 - 1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
 - 2. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.
- G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

- H. Refinish existing surfaces as indicated:
 - 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
- I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- J. Do not begin new construction in alterations areas before demolition is complete.
- K. Comply with all other applicable requirements of this section.

3.06 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Fit work to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- F. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Match color, texture, and appearance.
 - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.07 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.09 DEMONSTRATION AND INSTRUCTION

- A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
- B. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

3.10 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Testing, adjusting, and balancing HVAC systems: See Section 230593 - Testing, Adjusting, and Balancing for HVAC.

3.11 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Clean filters of operating equipment.
- G. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.12 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 1. Provide copies to Architect and Owner.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- E. Owner will occupy portions of the building as specified in Section 011000.
- F. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

- G. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- H. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- I. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

END OF SECTION

**SECTION 017800
CLOSEOUT SUBMITTALS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Project record documents.
- B. Operation and maintenance data.
- C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

- A. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Individual Product Sections: Specific requirements for operation and maintenance data.
- C. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION****3.01 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 1. Drawings.
 2. Addenda.
 3. Change Orders and other modifications to the Contract.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.

- D. Record information concurrent with construction progress.
- E. Record Drawings: Legibly mark each item to record actual construction including:
 1. Field changes of dimension and detail.
 2. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

- A. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- B. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- C. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 1. Product data, with catalog number, size, composition, and color and texture designations.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 1. Description of unit or system, and component parts.
 2. Identify function, normal operating characteristics, and limiting conditions.
 3. Include performance curves, with engineering data and tests.
 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Binders: Commercial quality, 8-1/2 by 11 inch (216 by 280 mm) three D side ring binders with durable plastic covers; 2 inch (50 mm) maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

3.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

END OF SECTION

**SECTION 024100
DEMOLITION****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Selective demolition of building elements for alteration purposes.

1.02 DEFINITIONS

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

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Not Use

PART 3 EXECUTION**3.01 DEMOLITION**

- A. Remove portions of existing interior construction as indicated in the Drawings.
- B. Remove other items indicated, for salvage, relocation, and reuse.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 1. Obtain required permits.
 2. Provide, erect, and maintain temporary barriers and security devices.
 3. Conduct operations to minimize effects on and interference with adjacent and occupants.
 4. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
 5. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Protect existing structures and other elements to remain in place and not removed.
 1. Provide bracing and shoring.

3.03 EXISTING UTILITIES

- A. Protect existing utilities to remain from damage.
- B. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

- C. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
 - 1. Verify construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from areas that remain occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 015000 in locations indicated on drawings.
- C. Remove existing work as indicated and required to accomplish new work.
 - 1. Remove items indicated on drawings.
- D. Services including, but not limited to, HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
 - 1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - 3. Verify that abandoned services serve only abandoned facilities before removal.
 - 4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.
- E. Protect existing work to remain.
 - 1. Prevent movement of structure. Provide shoring and bracing as required.
 - 2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
 - 4. Patch to match new work.

3.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.

END OF SECTION

**SECTION 035400
CAST UNDERLayment**

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Liquid-applied self-leveling floor underlayment.
 - 1. Use cementitious type at _____.

1.02 RELATED REQUIREMENTS

- A. Section 017000 - Execution and Closeout Requirements: Alteration project procedures; selective demolition for remodeling.

1.03 REFERENCE STANDARDS

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 50 mm [2 in.] Cube Specimens); 2024.
- B. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2022.
- C. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars; 2021.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.
- C. Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Instructions.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section, and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F (41 degrees C).

1.07 FIELD CONDITIONS

- A. Do not install underlayment until floor penetrations and peripheral work are complete.
- B. Maintain minimum ambient temperatures of 50 degrees F (10 degrees C) 24 hours before, during and 72 hours after installation of underlayment.
- C. During the curing process, ventilate spaces to remove excess moisture.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Cementitious Underlayment:
 - 1. ARDEX Engineered Cements; ARDEX K 10: www.ardexamericas.com/#sle.

2. LATICRETE International, Inc; NXT Level Plus with Primer Plus: www.laticrete.com/#sle.
3. Maxxon Corporation; Maxxon Commercial Level EZ: www.maxxon.com/#sle.
4. USG; Durock Quik-Top Self-Leveling Underlayment: www.usg.com/#sle.
5. Substitutions: See Section 016000 - Product Requirements.

2.02 MATERIALS

- A. Cast Underlays, General:
- B. Cementitious Underlayment: Blended cement mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:
 1. Compressive Strength: Minimum 4000 pounds per square inch (27.6 MPa) after 28 days, tested per ASTM C109/C109M.
 2. Flexural Strength: Minimum 1000 psi (6.9 MPa) after 28 days, tested per ASTM C348.
 3. Density: 125 pounds per cubic foot (2002 kg/cu m), nominal.
 4. Final Set Time: 1-1/2 to 2 hours, maximum.
 5. Thickness: Capable of thicknesses from feather edge to maximum 3-1/2 inch (89 mm).
 6. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.
- C. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to underlayment mix materials.
- D. Primer: Manufacturer's recommended type.
- E. Joint and Crack Filler: Latex-based filler, as recommended by manufacturer.

2.03 MIXING

- A. Site mix materials in accordance with manufacturer's instructions.
- B. Mix to self-leveling consistency without over-watering.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate.

3.02 PREPARATION

- A. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.
- B. Vacuum clean surfaces.
- C. Prime substrate in accordance with manufacturer's instructions. Allow to dry.
- D. Close floor openings.

3.03 APPLICATION

- A. Install underlayment in accordance with manufacturer's instructions.
- B. Place to indicated thickness, with top surface level to 1/8 inch in 10 ft (1:1000).
- C. For final thickness over 1-1/2 inches (38 mm), place underlayment in layers. Allow initial layer to harden to the point where the material has lost its evaporative moisture. Immediately prime and begin application of the subsequent layer within 24 hours.

3.04 CURING

- A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.

- B. Air cure in accordance with manufacturer's instructions.

3.05 PROTECTION

- A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking.
- B. Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION

**SECTION 053100
STEEL DECKING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Composite floor deck.
- B. Bearing plates and angles.

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A510/A510M - Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel; 2025.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- D. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.
- E. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018, with Errata (2022).
- F. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019, with Editorial Revision (2025).
- G. ICC-ES AC43 - Acceptance Criteria for Steel Deck Roof and Floor Systems; 2022.
- H. ICC-ES AC70 - Acceptance Criteria for Power-Actuated Fasteners Driven into Concrete, Steel and Masonry Elements; 2019, with Editorial Revision (2021).
- I. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks; 2007.
- J. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
- K. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.
- C. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.
- D. Certificates: Certify that products furnished meet or exceed specified requirements.
- E. Designer's Qualification Statement.

1.04 QUALITY ASSURANCE

- A. Design deck layout, spans, fastening, and joints under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M and dated no more than 12 months before start of scheduled welding work.
- C. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Steel Deck:
 - 1. Cordeck, Inc: www.cordeck.com/#sle.
 - 2. New Millennium Building Systems: www.newmill.com/#sle.
 - 3. Nucor-Vulcraft Group: www.vulcraft.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.

2.02 STEEL DECK

- A. All Deck Types: Select and design metal deck in accordance with SDI Design Manual.
 - 1. Calculate to structural working stress design and structural properties specified.
 - 2. Maximum Vertical Deflection of Floor Deck: 1/360 of span.
- B. Composite Floor Deck: Fluted steel sheet embossed to interlock with concrete:
 - 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
 - 2. Minimum Base Metal Thickness: 22 gauge, 0.0299 inch (0.76 mm).
 - 3. Nominal Height: 1-1/2 inches (38 mm).
 - 4. Profile: Fluted; SDI NR.

2.03 ACCESSORY MATERIALS

- A. Bearing Plates and Angles: ASTM A36/A36M steel, galvanized per ASTM A123/A123M.
- B. Welding Materials: AWS D1.1/D1.1M.
- C. Fasteners: Galvanized hardened steel, self tapping.
- D. Powder Actuated Mechanical Fasteners: Steel; with knurled shank and forged ballistic point. Comply with applicable requirements of ICC-ES AC70.
 - 1. Design Requirements: Provide number and type of fasteners that comply with the applicable requirements of SDI (DM) design method for roof deck and floor deck applications and ICC-ES AC43.
 - 2. Material: Steel; ASTM A510/A510M.
 - a. Hardness: Rockwell C 54.5, minimum.
 - b. Tensile Strength: 285 kips per square inch (1965 MPa), minimum.
 - c. Shear Strength: 175 kips per square inch (1205 MPa), minimum.
- E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- F. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.

2.04 FABRICATED DECK ACCESSORIES

- A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gauge, 0.0299 inch (0.76 mm) thick sheet steel; of profile and size as indicated; finished same as deck.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions prior to beginning work.

3.02 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.
- B. On steel supports provide minimum 1-1/2 inch (38 mm) bearing.
- C. Weld deck in accordance with AWS D1.3/D1.3M.
- D. At floor edges, install concrete stops upturned to top surface of slab, to contain wet concrete. Provide stops of sufficient strength to remain stationary without distortion.
- E. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION

SECTION 054000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed steel C-joist framing and bridging.

1.02 REFERENCE STANDARDS

- A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2016, with Supplement (2020).
- B. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing; 2015, with Errata (2020).
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- E. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.
- F. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
- G. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020 (Reapproved 2024).
- H. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other sections that is to be installed in or adjacent to metal framing systems, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by affected installers.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on cold-formed steel structural members; include material descriptions and base steel thickness.
- C. Product Data: Provide manufacturer's data on factory-made connectors and mechanical fasteners, showing compliance with requirements.
- D. Product Data: For lateral-force resisting systems, provide product data sheets on hold-down, showing compliance with requirements.
- E. Shop Drawings: Indicate component details, bearing, anchorage, loading, and type and location of fasteners, and accessories or items required of related work.
- F. Design Data:
 1. Shop drawings signed and sealed by a professional structural engineer.
 2. Design calculations sufficient to demonstrate compliance with design criteria; signed and sealed by a professional structural engineer.

- G. Designer's Qualification Statement.
- H. Manufacturer's Qualification statement.

1.05 QUALITY ASSURANCE

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Designer Qualifications: Design framing system under direct supervision of a professional structural engineer experienced in designing this work and licensed in the State in which the Project is located.
- C. Manufacturer Qualifications:
 - 1. Company specializing in manufacturing the types of products specified in this section, and with minimum 3 years of documented experience.
- D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Structural Framing:
 - 1. CEMCO: www.cemcosteel.com/#sle.
 - 2. ClarkDietrich: www.clarkdietrich.com/#sle.
 - 3. MarinoWARE: www.marinoware.com/#sle.
 - 4. SCAFCO Corporation: www.scafco.com/#sle.
 - 5. Substitutions: See Section 016000 - Product Requirements.
- B. Connectors:
 - 1. Same manufacturer as metal framing.

2.02 PERFORMANCE REQUIREMENTS

- A. Comply with requirements for Contractor's design-related professional design services indicated in Section 014000 - Quality Requirements.
- B. Design Requirements: Design cold-formed framing systems, components and connectors to withstand specified design loads in compliance with ICC (IBC), ASCE 7, AISI S100, and AISI S240.
- C. Design Criteria: As follows:
 - 1. Floor Live Loads:
 - a. Minimum Uniformly Distributed: 50 psf (244 kg/sq m).
 - b. Minimum Concentrated: 1,000 lbs (454 kg).
 - 2. Live load deflection meeting the following, unless otherwise indicated:
 - a. Floors: Maximum vertical deflection under live load of 1/480 of span.
 - 3. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
 - 4. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.03 MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.
 - 1. Structural Grade: As required to meet design criteria.

2.04 STRUCTURAL FRAMING COMPONENTS

- A. Joists: Structural C-Joists for elevated platform framing.
 - 1. Corrosion Protection Coating Designation: CP 60 in accordance with AISI S240.
 - 2. Thickness: 33 mils, 0.0329 inch (0.836 mm).
 - 3. Depth: _____ inches (_____ mm).
 - 4. Products:
 - a. ClarkDietrich; C Joist: Basis of Design. www.clarkdietrich.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.05 CONNECTIONS

- A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.
 - 1. Structural Grade: As required to meet design criteria.
- B. Structural Performance: Maintain load and movement capacity required by applicable building code and specified design criteria.
- C. Fixed Connections: Provide nonmovement devices for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.
- D. Bridging Connections: Provide mechanical load-transferring devices that accommodate wind load torsion and weak axis buckling induced by axial compression loads. Provide bridging connectors where indicated on the drawings.

2.06 MISCELLANEOUS CONNECTIONS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot-dip galvanized per ASTM A153/A153M.

2.07 SHEATHING

- A. Concrete Structural Panels:
 - 1. Products:
 - a. USG: Structo-Crete 3/4" Panel = Basis of Design.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.08 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Galvanizing Repair: Touch up bare steel with zinc-rich paint in compliance with ASTM A780/A780M.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify field measurements and adjust installation as required.

3.02 INSTALLATION - GENERAL

- A. Install structural members and connections in compliance with ASTM C1007.

3.03 INSTALLATION OF JOISTS

- A. Install framing components in accordance with manufacturer's instructions.
- B. Place joists at 16 inches (400 mm) on center; not more than 2 inches (50 mm) from abutting walls, and connect joists to supports using fastener method.

- C. Set floor joists parallel and level, with lateral bracing and bridging.
- D. Provide web stiffeners at reaction points.
- E. Touch-up field welds and damaged galvanized surfaces with primer.

3.04 INSTALLATION OF FLOOR SHEATHING

- A. Install sheathing as required by manufacturer to meet Project loading requirements.
- B. Fill C-Joist cavity with fiberglass sound blankets prior to sheathing installation as indicated in Drawings.

3.05 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.

END OF SECTION

**SECTION 055213
PIPE AND TUBE RAILINGS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Wall mounted handrails.

1.02 REFERENCE STANDARDS

- A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube; 2022.
- C. ASTM B429/B429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube; 2020.
- D. ASTM B483/B483M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Tube and Drawn Pipe for General Purpose Applications; 2021.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
 - 1. Include the design engineer's seal and signature on each sheet of shop drawings.
- C. Samples: Submit two, ____ inch (____ mm) long samples of handrail. Submit two samples of elbow, wall bracket, and end stop.
- D. Designer's Qualification Statement.

1.04 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.
- B. Fabricator Qualifications:
 - 1. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Handrails and Railings:
 - 1. Greco Aluminum Railings; _____ : www.grecorailings.com/#sle.
 - 2. Superior Aluminum Products, Inc; Series 5H Pipe Railing: Basis of Design www.superioraluminum.com/#sle.
 - 3. Ultra Aluminum Manufacturing, Inc: www.ultrafence.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.

2.02 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.
- B. Allow for expansion and contraction of members and building movement without damage to connections or members.

- C. Dimensions: See drawings for configurations and heights.
 - 1. Top Rails and Wall Rails: 1-1/2 inches (38 mm) diameter, round.
- D. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
- E. Provide slip-on non-weld mechanical fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.03 ALUMINUM MATERIALS

- A. Aluminum Pipe: Schedule 40; ASTM B429/B429M, ASTM B241/B241M, or ASTM B483/B483M.
- B. Non-Weld Mechanical Fittings: Slip-on cast aluminum, for Schedule 40 pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.
- C. Exposed Fasteners: No exposed bolts or screws.

2.04 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

2.05 ALUMINUM FINISHES

- A. Pigmented Organic Coating System: AAMA 2603 polyester or acrylic baked enamel finish.
- B. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Apply one coat of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Anchor railings securely to structure.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

END OF SECTION

**SECTION 057000
DECORATIVE METAL****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Decorative metal units.

1.02 REFERENCE STANDARDS

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- E. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2025.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Meeting: Schedule and conduct preinstallation meeting one week before starting work of this section. Attendees include:
 - 1. Contractor.
 - 2. Architect.
 - 3. Owner's representative.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's product data, including description of materials, components, finishes, fabrication details, anchors, and accessories.
- C. Shop Drawings: Indicate elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. See Section 017419 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Deliver materials in factory-provided protective coverings and packaging.
- C. Protect materials against damage during transit, delivery, storage, and installation at site.
- D. Inspect materials for damage upon delivery. Replace damaged and unrepairable materials. Ensure replacement materials are indistinguishable from undamaged parts and finishes.

E. Prior to installation, store materials and components under cover in a dry location.

PART 2 PRODUCTS

2.01 DECORATIVE METAL UNITS

A. Decorative Grilles for Electronic Units:

1. Base Metal: Aluminum.
 - a. 1/8" thick
2. Profile: Custom - As indicated on Drawings.
3. Size: Coordinate final size with electronic display unit be provided by Owner.
4. Perforations: "201 Parquet" Basis of Design by Archgrille.com
 - a. Perforation locations and size
5. Finish:
 - a. RAL # as selected by Architect
6. Mounting: #609 Surface mounted with snap-in catches. #609 method Basis of Design by Archgrille.com

2.02 MATERIALS

- A. General: Provide sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections exposed to view on finished units.
- B. Aluminum Components: ASTM B221 or ASTM B221M.
 1. Sheet Aluminum: ASTM B209/B209M, 5052 alloy, H32 or H22 temper.

2.03 FABRICATION

- A. Fit and shop assemble items in largest practical sections for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FINISHES

- A. General: Comply with NAAMM AMP 500-06.
 1. Complete mechanical finishes before fabrication. After fabrication, finish joints, bends, abrasions, and surface blemishes to match sheet.
 2. Protect mechanical finishes on exposed surfaces from damage.
 3. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.
 4. Appearance: Limit variations in appearance of adjacent pieces to one-half of range represented in approved samples. Noticeable variations in same piece are not acceptable. Install components within range of approved samples to minimize contrast.
- B. Aluminum Finishes:
 1. High Performance Organic Coatings: AAMA 2604; multiple coats, thermally cured fluoropolymer system.
 2. Color: As selected by Architect from manufacturer's full range.
 3. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.05 ACCESSORIES

- A. Anchors and Fasteners: Provide anchors, fasteners, and other attachment devices required to attach to structure. Ensure attachment devices are of same material as components unless indicated otherwise.
 - 1. Steel Fasteners: ASTM F3125/F3125M, Type 1, plain.
 - 2. Carbon Steel Fasteners: ASTM A307.
 - 3. Stainless Steel Fasteners: Type 304.
 - 4. Exposed Fasteners: Not allowed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's drawings and written instructions.
- B. Verify installation of Owner provided components prior to installation of grille.
- C. Install components plumb and level, accurately fitted, free from distortion or defects, and with tight joints, except where necessary for expansion.
- D. Anchor securely to structure.

3.02 CLEANING

- A. Remove protective film from exposed metal surfaces.
- B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents, or other substances that may damage the material or finish.

3.03 PROTECTION

- A. Protect installed components and finishes from damage after installation.
- B. Repair damage to exposed finishes to be indistinguishable from undamaged areas.
- C. If damage to finishes and components cannot be repaired to be indistinguishable from undamaged finishes and components, replace damaged items.

END OF SECTION

SECTION 061053
MISCELLANEOUS ROUGH CARPENTRY

PART 1 GENERAL**1.01 REFERENCE STANDARDS**

- A. APA E30 - Engineered Wood Construction Guide; 2019.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- C. AWPA U1 - Use Category System: User Specification for Treated Wood; 2025.
- D. ITS (DIR) - Directory of Listed Products; Current Edition.
- E. PS 1 - Structural Plywood; 2023.
- F. PS 20 - American Softwood Lumber Standard; 2025.
- G. UL (DIR) - Online Certifications Directory; Current Edition.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data:

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Cover wood products to protect against moisture. Support stacked products to prevent deformation and allow air circulation.
- B. Fire-Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

PART 2 PRODUCTS**2.01 GENERAL REQUIREMENTS**

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
 - 2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org), and that provides grading service for species and grade specified. Provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No.2 or Standard Grade.

2.03 CONSTRUCTION PANELS

- A. Communications and Electrical Room Mounting Boards: PS 1, A-D plywood; 3/4 inch (19 mm) thick; fire-retardant treated.

2.04 FIRE-RETARDANT TREATMENT (FRT)

- A. Factory-treat wood members in accordance with AWPA U1 and use category indicated.
- B. Fire-Retardant Treatment: Interior Type A, Use Category UCFA (LT), Low-Temperature (low hygroscopic).
 - 1. Treat electrical and communications panel backer boards.

- C. Kiln-dry after treatment (KDAT) to maximum moisture content of 19 percent for sawn material and 15 percent for plywood.
- D. Fabrication of FRT Wood:
 - 1. Ripping or milling of boards, lumber, and timber after treatment is not permitted.
 - 2. Field cutting to length and drilling of holes in boards, lumber, and timber are permitted without additional treatment.
 - 3. Field cutting and drilling of holes in plywood are permitted.
- E. Label or brand FRT wood with classification mark of UL (DIR) or ITS (DIR) or other approved inspection agency, the treatment plant, name of treatment, species of wood, flame spread and smoke-developed indexes, method of drying after treatment, and treating standard.

2.05 ACCESSORIES

- A. Metal and Finish of Fasteners:
 - 1. Fire-Retardant-Treated Wood:
 - a. Nails, timber rivets, wood screws, and lag screws: Hot-dip galvanized steel complying with ASTM A153/A153M Class D.
 - 2. Untreated Wood: Unfinished steel.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to greatest extent possible; clearly separate scrap for use on-site as accessory components, including shims, bracing, and blocking.

3.03 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- C. In walls, provide blocking attached to studs as backing and support for wall-mounted items unless item can be securely fastened to two or more studs or another method of support is explicitly indicated.
- D. Where ceiling mounting is indicated, provide blocking and supplementary supports above ceiling unless another method of support is explicitly indicated.
- E. Provide the following specific nonstructural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Wall brackets.
 - 3. Handrails.
 - 4. Wall paneling and trim.
 - 5. Wall mounted video monitors.
 - 6. Pony wall attachments.

3.04 INSTALLATION OF CONSTRUCTION PANELS

- A. Construction Panels - General: Install in accordance with APA E30.
- B. Communications and Electrical Room Mounting Boards: Secure with screws to studs; space fasteners at maximum 24 inches (610 mm) on center.

1. Install adjacent boards without gaps.

3.05 CLEANING

- A. Waste Disposal: See Section 017419 - Construction Waste Management and Disposal.
 1. Comply with applicable regulations.
 2. Do not burn scrap on project site.
 3. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.
- B. Do not leave wood, shavings, sawdust, etc. on ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering storm drainage system.

END OF SECTION

SECTION 064100
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Specially fabricated cabinet units.
- B. Hardware.

1.02 RELATED REQUIREMENTS

- A. Section 123600 - Countertops.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2022.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- D. BHMA A156.9 - Cabinet Hardware; 2020.
- E. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2024.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot (125 mm to 1 m), minimum.
 - 2. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- C. Product Data: Provide data for hardware accessories.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Single Source Responsibility: Provide and install this work from single fabricator.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.

1.08 FIELD CONDITIONS

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

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Cassidy Woodworks - Dayton Ohio.
- B. Robertson Cabinets - West Milton Ohio.

- C. Vaughn Interior Concepts - Dayton Ohio
- D. Substitutions: See Section 016000 - Product Requirements.
- E. Single Source Responsibility: Provide and install this work from single fabricator.

2.02 CABINETS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Plastic Laminate Faced Cabinets: Custom grade.
- C. Cabinets:
 - 1. Finish - Exposed Exterior Surfaces: Decorative laminate.
 - 2. Finish - Exposed Interior Surfaces: White Melamine.
 - 3. Finish - Concealed Surfaces: Manufacturer's option.
 - 4. Cabinet Style: Flush overlay.
 - 5. Cabinet Doors and Drawer Fronts: Flush style.

2.03 PANEL CORE MATERIALS

- A. Particleboard: Composite panel composed of cellulosic particles, additives, and bonding system; comply with ANSI A208.1.
 - 1. Grade: M-2; moisture resistance: MR10.
 - 2. Panel Thickness: 3/4 inch (19.1 mm).

2.04 HARDWOOD PLYWOOD PANELS

- A. Hardwood Plywood: Plywood manufactured for nonstructural decorative applications; consisting of faces and backs applied to a variety of core types; comply with HPVA HP-1.
 - 1. Woodwork Quality Standard: Panels complying with specified woodwork quality standard.

2.05 LAMINATE MATERIALS

- A. Manufacturers:
 - 1. Arborite: www.arborite.com/#sle.
 - 2. Formica Corporation: www.formica.com/#sle.
 - 3. Wilsonart LLC: www.wilsonart.com/#sle.
 - a. Basis of Design
 - b. Refer to Drawings for finish selection
- 4. Substitutions: See Section 016000 - Product Requirements.

2.06 COUNTERTOPS

- A. Countertops: See Section 123600.

2.07 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- C. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

2.08 HARDWARE

- A. Cabinet Hardware: Comply with BHMA A156.9 for hardware types and grades indicated below:

1. Hardware Types: As indicated on drawings.
2. Product Grade: Grade 1.
- B. Adjustable Shelf Supports: Standard side-mounted system using multiple holes for pin supports and coordinated self rests, satin chrome finish, for nominal 1 inch (25 mm) spacing adjustments.
- C. Drawer and Door Pulls: "U" shaped wire pull, steel with chrome finish, 5 inch centers ("U" shaped wire pull, steel with chrome finish, ____ mm centers).
 1. Hafele "TAG" pull or Approved Equal
- D. Drawer Slides:
 1. Type: Full extension with lever disconnect.
 2. Static Load Capacity: 300 lb capacity, minimum.
 3. Mounting: Side mounted.
 4. Stops: Integral type.
 5. Features: Provide self closing/stay closed type.
- E. Hinges: European style concealed self-closing type, steel with satin finish.
 1. Manufacturers:
 - a. Blum, Inc; CLIP top BLUMOTION: www.blum.com = Basis of Design
 - b. Rockler
 - c. Titus Cabinet Hardware; T-Type Concealed Hinge: www.titusplus.com/us/en/#sle.
 - d. Substitutions: See Section 016000 - Product Requirements.
- F. Keyboard Tray: Integral ball-bearing slides; adjustable tilt, gel palm rest, storage compartments, cable management, and mouse pad.
 1. Manufacturers:
 - a. Accuride International, Inc; CBERGO-TRAY 300: www.accuride.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.09 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units.

3.03 ADJUSTING

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

3.04 CLEANING

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

END OF SECTION

**SECTION 079200
JOINT SEALANTS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

1.03 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2017 (Reapproved 2023).
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018 (Reapproved 2024).
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2025.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 2. List of backing materials approved for use with the specific product.
 3. Backing material recommended by sealant manufacturer.
 4. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 5. Substrates the product should not be used on.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards with physical sealant examples showing standard colors available for selection.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Nonsag Sealants:
 1. Bostik Inc: www.bostik-us.com/#sle.
 2. Dow: www.dow.com/#sle.
 3. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
 4. Substitutions: See Section 016000 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
 1. Interior Joints:

- a. Do not seal interior joints indicated on drawings as not sealed.
- b. Do not seal gaps and openings in gypsum board and suspended ceilings
- c. Seal the following joints:
 - 1) Joints between door frames and window frames and adjacent construction.
 - 2) In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, and piping penetrations.

B. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.

- 1. Type ____ - In Sound-Rated Assemblies: Acrylic emulsion latex sealant.

C. Interior Wet Areas: Breakrooms; fixtures in wet areas include plumbing fixtures, countertops, cabinets, and other similar items.

D. Sound-Rated Assemblies: Walls and ceilings identified as STC-rated, sound-rated, or acoustical.

2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products with acceptable levels of volatile organic compound (VOC) content; see Section 016116.
- B. Colors: As selected by Architect

2.04 NONSAG JOINT SEALANTS

- A. Silicone Sealant: ASTM C920, Grade NS, Uses M, A, G, and O; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Color: To be selected by Architect from manufacturer's standard range.
- B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 - 1. Color: Clear.
- C. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 50 percent, minimum.
 - 2. Color: To be selected by Architect from manufacturer's standard range.
- D. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, nonstaining, nonbleeding, nonsagging; not intended for exterior use.
 - 1. Color: To be selected by Architect from manufacturer's standard range.

2.05 ACCESSORIES

- A. Sealant Backing Materials, General: Materials placed in joint before applying sealants; assists sealant performance and service life by developing optimum sealant profile and preventing three-sided adhesion; type and size recommended by sealant manufacturer for compatibility with sealant, substrate, and application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.

3.02 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION

SECTION 081113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal frames for wood doors.

1.02 RELATED REQUIREMENTS

- A. Section 087100 - Door Hardware.

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.
- C. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2025.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- E. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2024.
- F. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- G. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- H. NAAMM HMMA 840 - Guide Specifications for Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2024.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- D. Manufacturer's Qualification Statement.
- E. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
- C. Maintain at project site copies of reference standards relating to installation of products specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company; ____: www.assaabloydss.com/#sle.
 - 2. Mesker, dormakaba Group; FDJ Series Drywall Frames: www.meskeropeningsgroup.com/#sle.
 - 3. Steelcraft, an Allegion brand; ____: www.allegion.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 - 1. Frame Metal Thickness: 18 gauge, 0.042 inch (1.0 mm), minimum.
- D. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

2.04 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

- B. Coordinate frame anchor placement with wall construction.
- C. Install door hardware as specified in Section 087100.

3.03 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

3.04 ADJUSTING

- A. Adjust for smooth and balanced door movement.

END OF SECTION

**SECTION 081416
FLUSH WOOD DOORS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Transom panels.

1.02 RELATED REQUIREMENTS

- A. Section 088000 - Glazing.
- B. Section 099123 - Interior Painting: Field finishing of doors.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- C. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2021, with Errata (2022).

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- D. Manufacturer's qualification statement.
- E. Installer's qualification statement.
- F. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

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

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide manufacturer's warranty on interior doors for the life of the installation. Complete forms in Owner's name and register with manufacturer.
 - 1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Wood Veneer Faced Doors:
 - 1. Forte Opening Solutions: www.forteopenings.com/#sle.
 - 2. VT Industries, Inc: www.vtindustries.com/#sle.
 - 3. Oshkosh Door Company.
 - 4. Substitutions: See Section 016000 - Product Requirements.

2.02 DOORS AND PANELS

- A. Doors: See drawings for locations and additional requirements.
 - 1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS), AWMAC/WI (NAAWS) or WDMA I.S. 1A.
 - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches (44 mm) thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at each location.
 - 2. Wood veneer facing for field opaque finish as indicated on drawings.
- C. Transom Panels: Same construction and finish as door; same performance rating as door.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

2.04 DOOR FACINGS

- A. Veneer Facing for Opaque Finish: Medium density overlay (MDO), in compliance with indicated quality standard.

2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
 - 1. Provide solid blocks at lock edge for hardware reinforcement.
- C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
 - 1. Exception: Doors to be field finished.
- F. Provide edge clearances in accordance with the quality standard specified.

2.06 FINISHES - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Opaque:
 - a. System - 2, Lacquer, Precatalyzed.
 - b. Color: As selected by Architect.
 - c. Sheen: Satin.
- B. Finish work in accordance with WDMA I.S. 1A for grade specified and as follows:
 - 1. Opaque:

- a. System - OP-2, Catalyzed Lacquer.
- b. Color: As selected by Architect.
- c. Sheen: Satin.

2.07 ACCESSORIES

- A. Wood Louvers:
 - 1. Material and Finish: Match door face
 - 2. Louver Blade: Chevron louver.
 - 3. Louver Free Area: 28 percent.
- B. Door Window Frames: Door window frames with glazing securely fastened within door opening.
 - 1. Size: As indicated on drawings.
 - 2. Glazing: 1/4 inch (6.4 mm) thick, tempered glass, in compliance with requirements of authorities having jurisdiction and Section 088000.
- C. Glazing Stops: Wood, of same species as door facing, mitered corners; prepared for countersink style tamper proof screws.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Field-Finished Doors: Trimming to fit is acceptable.
 - 1. Adjust width of non-rated doors by cutting equally on both jamb edges.
 - 2. Trim maximum of 3/4 inch (19 mm) off bottom edges.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Coordinate installation of glazing.
- F. Install door louvers plumb and level.

3.02 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

END OF SECTION

SECTION 081433
STILE AND RAIL WOOD DOORS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Wood doors, stile and rail design; non-fire rated.

1.02 RELATED REQUIREMENTS

- A. Section 087100 - Door Hardware.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate stile and rail core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, and factory machining criteria.
- D. Manufacturer's qualification statement.
- E. Installer's qualification statement.
- F. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

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

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver, and store doors in accordance with quality standard specified.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, telegraphing core construction, and _____.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Stile and Rail Wood Doors:

1. Forte Opening Solutions; Aspiro Authentic Stile & Rail Doors: www.forteopenings.com/#sle.
2. VT Industries, Inc; ____: www.vtindustries.com/#sle.
3. Substitutions: See Section 016000 - Product Requirements.

2.02 DOORS

- A. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches (44.45 mm) thick unless otherwise indicated; solid lumber construction; mortise and tenon joints. Opaque finish as indicated on drawings.
- C. Design Style/Pattern: Match existing door style.

2.03 DOOR AND PANEL FACINGS

- A. Materials for Opaque Finishes: Material allowed by quality standard indicated.
- B. Adhesive: Type I - Waterproof.

2.04 DOOR CONSTRUCTION

- A. Vertical Exposed Edge of Stiles: Of same species as veneer facing.
- B. Bond edge banding to cores.
- C. Panels: As required to match existing wood doors.
- D. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- F. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.

2.05 FINISHES

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 1. Opaque:
 - a. System - 2, Lacquer, Precatalyzed.
 - b. Color: As selected by Architect.
 - c. Sheen: Satin.

2.06 ACCESSORIES

- A. Door Hardware: See Section 087100.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out of tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standards.
- B. Field-Finished Doors: Trimming to fit is acceptable.

1. Adjust width of non-rated doors by cutting equally on both jamb edges.
2. Trim door height by cutting bottom edges to a maximum of 3/4 inch (19 mm).
- C. Machine cut for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.

3.03 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

END OF SECTION

**SECTION 083100
ACCESS DOORS AND PANELS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Wall-mounted access units.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

PART 2 PRODUCTS**2.01 ACCESS DOORS AND PANELS ASSEMBLIES**

- A. Wall-Mounted Units with Return Air Grille:
 - 1. Location: As indicated on drawings.
 - 2. Panel Material: Aluminum extrusions with gypsum board inlay.
 - 3. Size: 12 by 12 inches (305 by 305 mm).
 - 4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
 - 5. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.

2.02 WALL-MOUNTED ACCESS UNITS

- A. Manufacturers:
 - 1. Activar Construction Products Group, Inc. - JL Industries: www.activarcpg.com/#sle.
 - 2. ACUDOR Products Inc: www.acudor.com/#sle.
 - 3. Best Access Doors: www.bestaccessdoors.com/#sle.
 - 4. FF Systems, Inc: www.ffsystemsinc.com/#sle.
 - 5. Substitutions: See Section 016000 - Product Requirements.
- B. Wall-Mounted Units: Factory-fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
 - 1. Style: Recessed door panel for infill with wall/ceiling finish.
 - a. Gypsum Board Mounting Criteria: Use drywall bead type frame.
 - 2. Door Style: Single thickness with rolled or turned in edges.
 - 3. Frames: 16-gauge, 0.0598-inch (1.52 mm) minimum thickness.
 - 4. Single Steel Sheet Door Panels: 16-gauge, 0.0625-inch (1.6 mm) minimum thickness.
 - 5. Hardware:
 - a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
 - b. Latch/Lock: Cylinder lock-operated cam latch, two keys for each unit.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.

- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.
- D. Install wall finish treatment to drywall inlay, matching adjacent surfaces as specified.

END OF SECTION

SECTION 084313
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Aluminum-framed storefront, with vision glass.
- B. Infill panels of wood veneer.
- C. Aluminum doors.
- D. Weatherstripping.

1.02 RELATED REQUIREMENTS

- A. Section 087100 - Door Hardware: Hardware items other than specified in this section.
- B. Section 088000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.
- B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- F. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
- D. Samples: Submit two samples 3x3 inches (____ x ____ mm) in size illustrating finished aluminum surface, glass, infill panels, glazing materials.
- E. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.
- H. Specimen warranty.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Aluminum-Framed Storefronts:
 - 1. Kawneer North America: www.kawneer.com/#sle.
 - 2. Oldcastle BuildingEnvelope: www.oldcastlebe.com/#sle.
 - 3. YKK AP America, Inc: www.ykkap.com/commercial/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.

2.02 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Glazing Rabbet: For 1/4 inch (6 mm) monolithic glazing.
 - 2. Glazing Position: Centered (front to back).
 - 3. Finish: High performance powder coatings.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
 - 4. Frame construction: Non-thermal
 - 5. Finish Color: Match existing storefront finish found within the main lobby..
 - 6. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 7. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 8. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
 - 9. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 - 10. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
- B. Performance Requirements

1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Design Wind Loads: Comply with requirements of ASCE 7.
 - 1) 5 lbf/sq ft interior condition
 - b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections
 1. Glazing Stops: Flush.
 2. Cross-Section: 2 inch by 4 inch (____ by ____ mm) nominal dimension.
- B. Glazing: See Section 088000.
- C. Infill Panels: 1/4" inch (____ mm) thick wood veneer transom panel.
 1. Finish: Stained wood veneer to match existing transom panels in existing storefront.
- D. Swing Doors: Glazed aluminum.
 1. Thickness: 1-3/4 inches (43 mm).
 2. Top Rail: 6 inches (____ mm) wide.
 3. Vertical Stiles: 6 inches (____ mm) wide.
 4. Bottom Rail: 10 inches (254 mm) wide.
 5. Glazing Stops: Square.
 6. Finish: Same as storefront.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Sealant for Setting Thresholds: Non-curing butyl type.
- D. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- E. Glazing Accessories: See Section 088000.

2.05 FINISHES

- A. High Performance Organic Coating: Primer and topcoat coatings system based on super durable polyester resin powder containing high level of isophthalic acid; with minimum dry film thickness (DFT) of 2 to 3.5 mil, 0.0020 to 0.0035 inch (0.051 to 0.089 mm) over aluminum extrusions and panels; meeting requirements of AAMA 2604.
- B. Color: As selected by Architect from manufacturer's full range.
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.06 HARDWARE

- A. For each door, include weatherstripping and sill sweep strip.
- B. Other Door Hardware: See Section 087100.
- C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
- D. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify dimensions, tolerances, and method of attachment with other work.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet (1.5 mm per m) non-cumulative or 0.06 inch per 10 feet (1.5 mm per 3 m), whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).

3.04 ADJUSTING

- A. Adjust operating hardware and sash for smooth operation.

3.05 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.

3.06 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

**SECTION 087100
– FINISH HARDWARE****PART 1 GENERAL****1.01 REFERENCE STANDARDS**

- A. BHMA A156.2 - Bored and Preassembled Locks and Latches; 2022.
- B. BHMA A156.4 - Door Closers and Pivots; 2024.
- C. BHMA A156.22 - Standard for Gasketing; 2021.
- D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.
- E. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

1.02 REFER TO "GENERAL AND SPECIAL CONDITIONS", AND "INSTRUCTIONS TO BIDDERS", DIVISION 01 OF SPECIFICATIONS. REQUIREMENTS OF THESE SECTIONS AND THE PROJECT DRAWINGS SHALL GOVERN WORK IN THIS SECTION.**1.03 SUMMARY:**

- A. Section Includes:
 1. Furnish all items of Finish Hardware specified, scheduled, shown or required herein except those items specifically excluded from this section of the specification.
- B. Specific Omissions: Hardware for the following is specified or indicated elsewhere, unless specifically listed in the hardware sets:
 1. Aluminum Storefront Doors
 2. Access doors and panels
 3. Overhead and Coiling doors

1.04 SUBMITTALS:

- A. Hardware Schedule
 1. Submit number of Hardware Schedules as directed in Division 1.
 2. Follow guidelines established in Door & Hardware Institute Handbook (DHI) Sequence and Format for the Hardware Schedule unless noted otherwise.
 3. Schedule will include the following:
 - a. Door Index including opening numbers and the assigned Finish Hardware set.
 - b. Preface sheet listing category only and manufacturer's names of items being furnished as follows:

CATEGORY	SPECIFIED	SCHEDULED
Hinges	Manufacturer A	Manufacturer B
Lock sets	Manufacturer X	Manufacturer X
Kick Plates	Open	Manufacturer Z

- c. Hardware Locations: Refer to Article 3.1.C.2 Locations.
- d. Opening Description: Single or pair, number, room locations, hand, active leaf, degree of swing, size, door material, frame material, and UL listing.
- e. Hardware Description: Quantity, category, product number, fasteners, and finish.
- f. Headings that refer to the specified Hardware Set Numbers.
- g. Scheduling Sequence shown in Hardware Sets.
- h. Product data of each hardware item, and shop drawings where required, for special conditions and specialty hardware.
- i. Electrified Hardware system operation description.

- j. "Vertical" scheduling format only. "Horizontal" schedules will be returned "Not Approved."
- k. Typed Copy.
- l. Double-Spacing.
- m. 8-1/2 x 11 inch (279.4 mm) sheets
- n. U.S. Standard Finish symbols or BHMA Finish symbols.

B. Product Data:

- 1. Submit, in booklet form Manufacturer's Catalog cut sheets of scheduled hardware.
- 2. Submit product data with hardware schedule.

C. Wiring Diagrams:

- 1. Submit elevation drawings showing relationship of all electrical and pneumatic hardware components to door and frame. Indicate number and gage of wires required.
 - a. Include wiring drawing showing point to point wire hook up for all components.
 - b. Include system operations descriptions for each type of opening; describe each possible condition.

D. Key Schedule:

- 1. Submit detailed schedule indicating clearly how the Owner's final keying instructions have been followed.
- 2. Submit as a separate schedule.

E. Samples:

- 1. Prior to submittal of the final hardware schedule and prior to final ordering of finish hardware, submit one sample, if required, of each type of exposed hardware unit, finished as required and tagged with full description for coordination with schedule.
- 2. Samples will be returned to the supplier. Units, which are acceptable and remain undamaged through submittal, review and field comparison procedures, may, after final check of operation, be used in the work, within limitations of keying coordination requirements.

F. Operations and Maintenance Manuals

- 1. Provide operations and maintenance manuals for each type of door hardware.

G. Factory Order Acknowledgements

- 1. Submit to General Contractor, the factory order acknowledgement numbers for the various hardware items to be used on the project. The factory order acknowledgement numbers shall help to facilitate and expedite any service that may be required on a particular hardware item. General Contractor shall keep these order acknowledgement numbers on file.

1.05 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

- 1. Furnish finish hardware to comply with the requirements of laws, codes, ordinances, and regulations of the governmental authorities having jurisdiction where such requirements exceed the requirements of the Specifications.
- 2. Furnish finish hardware to comply with the requirements of the regulations for public building accommodations for physically handicapped persons of the governmental authority having jurisdiction and to comply with Americans with Disabilities Act.
- 3. Provide hardware for fire rated openings in compliance with NFPA 80 and state and local building code requirements. Provide only hardware that has been tested and listed by UL for types and sizes of doors required and complies with requirements of door and door frame labels.

B. Supplier:

1. Mechanical Hardware

- a. Shall be an established firm dealing in contract builders' hardware. He must have adequate inventory, qualified personnel on staff and be located within 100 miles (160.93 kilometers) of the project. The distributor must be a factory-authorized dealer for all materials required. The supplier shall be or have in employment an Architectural Hardware Consultant (AHC).

2. Electrified Hardware:

- a. Shall be an experienced door hardware supplier who has completed projects with electrified door hardware similar in material, design, and extent to that indicated for this project, whose work has resulted in construction with a record of successful in-service performance, and who is acceptable to manufacturer of primary materials.
- b. Shall prepare data for electrified door hardware, including shop drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this project.
- c. Shall have experience in providing consulting services for electrified door hardware installations.

C. Installer:

1. The Installers shall have a minimum of 3 years experience installing door hardware for project similar in size and complexity.

D. Pre-installation Meeting:

1. Before hardware installation, General Contractor will request a hardware installation meeting be conducted on the installation of hardware; specifically that of locksets, closers, exit devices, overhead stops and coordinators. Manufacturer's representatives of the above products, in conjunction with the hardware supplier for the project, shall conduct the meeting. Meeting to be held at job site and attended by installers of hardware for aluminum, hollow metal and wood doors. Meeting to address proper coordination and installation of hardware, per finish hardware schedule for this specific project, by using installation manuals, hardware schedule, templates, physical product samples and installation videos.
2. When any electrical or pneumatic hardware is specified this meeting shall also include the following trades/installers: Electrical, Security, Alarm systems and Architect.

E. Manufacturer:

1. Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.
2. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Fire-Rated Door Assemblies:

1. 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 NFPA 252.
2. Positive Pressure Test: After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40 inches (1016 mm) or less above the sill.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Inventory door hardware on receipt.

- B. Label each item of hardware with the appropriate door number and Hardware Schedule heading number, and deliver to the installer so designated by the contractor.

C. Provide secure lock-up for door hardware delivered to Project site.

1.07 WARRANTIES:

- A. Refer to Division 01 for warranty requirements.
- B. During the warranty period, replace defective work, including labor, materials and other costs incidental to the work. Replace work found to be defective as defined in the General Conditions.

1.08 MAINTENANCE AND SERVICE:

- A. Furnish a complete set of specialized tools for the Owner's continued adjustment, maintenance, and removal/replacement of door hardware.

PART 2 PRODUCT

2.01 MANUFACTURER'S:

- A. Provide the products of manufacturer designated or if more than one manufacturer is listed, the comparable product of one of the other manufacturer's listed. Where only one manufacturer or product is listed, it is understood that this is the owner's Building Standard and "no substitution" is allowed.
- B. The first manufacturer listed for each product is the manufacturer used in the hardware sets.

2.02 MATERIALS:

A. Screws and Fasteners:

1. Furnish fasteners of the proper type, size, quantity and finish. Use machine screws and expansion shields for attaching hardware to concrete or masonry, and wall grip inserts at hollow wall construction. Furnish machine screws for attachment to reinforced hollow metal doors and frames and reinforced aluminum doors and frames. Furnish full thread wood screws for attachment to solid wood doors and frames. "TEK" type screws are not acceptable.
2. Sex bolts will not be permitted on reinforced metal doors or wood doors where blocking is specified.

B. Hinges:

1. Quantity: Provide the following, unless otherwise indicated:
 - a. Two Hinges: For doors with heights up to 60 inches (1524 mm).
 - b. Three Hinges: For doors with heights 61 to 90 inches (1549 to 2286 mm).
 - c. Four Hinges: For doors with heights 91 to 120 inches (2311 to 3048 mm).
 - d. For doors with heights more than 120 inches (3048 mm), provide 4 hinges, plus 1 hinge for every 30 inches (762 mm) of door height greater than 120 inches (3048 mm).
2. Hinge Sizes: Provide the following, unless otherwise indicated:
 - a. 4-1/2 inches (114 mm) high: For all doors with widths of 36 inches (914.4 mm) or less.
 - b. 5 inches (127 mm) high: For all doors with widths greater than 36 inches (914.4 mm).
3. Hinge Base Metal Thickness: Provide the following, unless otherwise indicated:
 - a. Medium Weight Doors with Medium Frequency: 0.134 inches (3.4 mm) thick.
 - b. Heavy Weight Doors with High Frequency: 0.180 inches (4.57 mm) thick.
4. Hinge Base Metal: Unless otherwise indicated, provide the following:
 - a. Exterior Hinges: Stainless steel, with stainless-steel pin.
 - b. Interior Hinges: Steel, with steel pin.
 - c. Hinges for Fire-Rated Assemblies: Steel, with steel pin.

5. Hinge Options: Where indicated in door hardware sets or on Drawings:
 - a. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for out-swinging exterior doors and out-swinging corridor doors with locks.
 - b. Corners: Square.
 - c. Width of Hinges: Shall be sufficient to clear all trim.
6. Fasteners: Provide Phillips flat-head screws comply with the following:
 - a. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
 - b. Wood Screws: For wood doors and frames.
 - c. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
 - d. Finish screw heads to match surface of hinges.
7. Manufacturer's:
 - a. Ives; an Ingersoll-Rand Company (IVE).
 - b. Stanley, a Stanley Black and Decker Company (STA).
 - c. Hager Companies (HAG).
 - d. McKinney; an ASSA Abloy Company (MCK).

C. Continuous Gear Hinge:

1. General: 6063-T6 aluminum alloy, anodized finish (cap on entire hinge painted if specified). Manufacturer to template, uncut hinges non-handed, pinless assembly, three interlocking extrusions, full height of door and frame, lubricated polyacetal thrust bearing, fasteners 410 stainless steel plated and hardened. All hinge profiles to be manufactured to template bearing locations, with standard duty bearing configurations at 5-1/8" spacing with a minimum of 16 bearings: and heavy duty at 2-9/16" spacing with a minimum of 32 bearings. Anodizing of material shall be done after fabrication of components so that all bearing slots are anodized.
2. Length: 1" less than door opening height. Fastener 12-24 x 1/2" #3 Phillips keen form stainless steel self-tapping at aluminum and hollow metal doors, 12- 1/2" #3 Philips, flathead full thread at wood doors.
3. Furnish fire rated hinges "FR" at labeled openings.
4. Manufacturer's:
 - a. For Aluminum frames;
 - 1) Manufacturer's:
 - (a) Ives; an Ingersoll Rand Company, 112HD series (IVE).
 - (b) Select Products Ltd., SL11HD series (SEL).
 - (c) Pemko, FMSLFHD series (PEM).

D. Dual swing self closing hinges

1. General: Steel, heavy-duty barrel hinge with integrated spring closer.
2. Length: 4-1/2"
3. Finish: US26D
4. Manufacturers:
 - a. Bommer Industries
 - b. Waterson
 - c. Hager

E. Locks and Latches

1. Bored Locks, Standard Duty:
 - a. All Bored Locks shall be designed to meet BHMA A156.2, Grade 1 test standards and certified by an independent testing laboratory.
 - b. Locks shall be capable of accepting interchangeable core as specified.

- c. Provide 2-3/4 inch (70 mm) backset.
- d. Provide strikes with extended lips where required to protect trim from being marred by latch bolt. Provide strike lips that do not project more than 1/8" beyond doorframe trim at single doors and have 7/8" lip to center at pairs of 1-3/4" doors.
- e. Manufacturer's:
 - 1) Best SFIC
- f. Lockset Trim:
 - 1) Falcon, Quantum
 - 2) Best, 14C
 - 3) Sargent, OL

F. Exit Devices:

- 1. Touchpad Style:
 - a. All exit devices shall meet ANSI A156.3, 1994, Grade 1 test standards.
 - b. Devices shall be push through type with stainless steel touch pad design.
 - c. Center Case: Shall be interchangeable with all functions.
 - d. Mechanism End Cap: Shall be a stamped or forged metal. Plastic end caps will not be acceptable.
 - e. Trim: Shall be heavy-duty type.
 - f. Manufacturer's:
 - 1) Falcon; an Ingersoll Rand Company, 25 series (FAL).
 - 2) Sargent; an ASSA Abloy Company, 80 series (SAR).
 - 3) Precision; a Stanley Black and Decker Company, Apex series (PRE).
 - g. Trim:
 - 1) As specified in sets.
 - 2) Levers to match lockset design where specified.

G. Surface Door Closers:

- 1. All Surface Door Closers shall be designed to meet BHMA A156.4, Grade 1 test standards and certified by an independent testing laboratory.
- 2. Refer to door and frame details and furnish accessories such as drop plates, panel adapters, spacers and supports as required to correctly install door closers. State degree of door swing in the hardware schedule.
- 3. Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.
- 4. Manufacturer's:
 - a. Falcon; an Ingersoll Rand Company, SC70 series (FAL).
 - b. Stanley; a Stanley Black and Decker Company, D-4551 series (RYO).
 - c. Sargent; an ASSA Abloy Company, 350 series (SAR).

H. Door Trim:

- 1. Push Plates: 6 x 16 x .050 inches (1.27 mm). If stile widths will not accept 6", provide stile width less 1/2". Provide cut out for thumb turn or cylinder as required.
- 2. Push-Pull Units: One inch round rod. Push: Straight push bar, Pull: 90 degree off-set, 10" centers. Attach top post of pull back to back with latch stile end of push bar, bottom post of pull and hinge stile end of push bar with end caps.
- 3. Pulls: One inch round rod, straight 10" centers.
- 4. Pull Plates: 4 x 16 x .050 inches (1.27 mm). 10" center. Provide cut out for thumb turn or cylinder as required.
- 5. Manufacturer's:
 - a. Ives; an Ingersoll Rand Company, series as listed in sets (IVE).

- b. Equal products from any member of B.H.M.A.
- I. Protection Plates:
 - 1. Kick Plates:
 - a. Furnish beveled on 4 edges, countersink fastening, .050" thick x 10" high x 1-1/2" less door width for the push side on single doors and 1" less door width for the pull side on single doors and push or pull side on pairs.
 - 2. Armor Plates:
 - a. Furnish beveled on 4 edges, countersink fastening, .050" thick x 42" high x 1-1/2" less door width for the push side on single doors and 1" less door width for the pull side on single doors and push or pull side on pairs.
 - 3. Mop Plates:
 - a. Furnish beveled on 4 edges, countersink fastening, .050" thick x 4" high x 1-1/2" less door width for the push side on single doors and 1" less door width for the pull side on single doors and push or pull side on pairs.
 - 4. Manufacturer's:
 - a. Ives; an Ingersoll Rand Company, 8400 series and 8402 series for rated openings for plates over 16" high (IVE).
 - b. Equal products of any B.H.M.A. manufacturer.
- J. Silencers: All door frames shall have rubber silencers typical unless noted otherwise.
- K. Door Stops:
 - 1. Wall Bumpers:
 - a. Wrought, forged, or cast, approximately 2-1/2 inch (12.7 mm) diameter, convex or concave rubber center, concealed fasteners.
 - 1) Ives; an Ingersoll Rand Company, WS407CCV/CVX (IVE).
 - 2) Equal products of any B.H.M.A. manufacturer.
 - 3) Color of rubber center shall be black.
 - 2. Overhead Stops and Holders:
 - a. Size per manufacturer's selector chart. Plastic end caps, hold open mechanisms and shock blocks are not allowed. End caps must be finished same as balance of unit.
 - b. Manufacturer products using base material of Brass/Bronze for US3, US4, & US10B finished products and 300 Stainless Steel for US32 & US32D finished products.
 - c. Manufacturer's:
 - 1) Glynn-Johnson; an Ingersoll Rand Company, series as listed in sets (GLY).
 - 2) Equal products of any BHMA manufacturer.
- L. Thresholds and Gasketing:
 - 1. Thresholds:
 - a. 1/2" high - 5" wide. Cope at jambs.
 - b. Furnish full wall opening width when frames are recessed.
 - c. Cope in front of mullions if thresholds project beyond door faces.
 - d. Furnish with non-ferrous Stainless Steel Screws and Lead Anchors.
 - 1) National Guard Products Inc. as listed in sets (NGP).
 - 2) Equal of Zero or Reese
 - e. Thresholds for exterior non-accessible (non ADA) door openings shall be similar to NGP 896 with rubber black bumper seal.
 - 2. Door Sweeps:
 - a. Surface Sweeps with drip cap:
 - 1) National Guard Products Inc., (NGP).
 - 2) Equal by Zero or Reese

3. Perimeter Gasketing:
 - a. Apply to head and jamb stops.
 - b. Solid Bar stock all sides
 - 1) National Guard Products Inc., (NGP).
 - 2) Equal by Zero or Reese
4. Automatic Door Bottom
 - a. Full Mortise installation, aluminum base material
 - b. ANSI/BHMA A156.22 compliant
 - 1) Pemko STC411 Series or approved equal

M. Miscellaneous Hardware:

1. Silencers:
 - a. Provide silencers for all interior doors without gasketing.
 - 1) Ives; an Ingersoll Rand Company, SR series (IVE).
 - 2) Equal product of any BHMA manufacturer
2. Drip Caps
 - a. Size drip cap: Door width plus 4"
 - 1) National Guard Products Inc., 16A (NGP).
 - 2) Equal by Zero by Reese

N. Furnish items not categorized in the above descriptions but specified by manufacturer's names in Hardware Sets.

2.03 FINISHES:

- A. Generally, Dull Chrome, US26D / BHMA 626. Provide finish for each item as indicated in sets. All door hardware finishes are to match storefront and curtainwall colors as shown in the Architectural Finish Plans.

2.04 CYLINDERS AND KEYING:

- A. All cylinders for this project will be supplied by one supplier regardless of door type and location. Match Owner's existing keyway system, interchangeable core
- B. The Finish Hardware supplier will meet with Architect and/or Owner to finalize keying requirements and obtain keying instructions in writing.
- C. Provide a cylinder for all hardware components capable of being locked.
- D. Provide cylinders master and grand master keyed to Owner's requirements. Provide two change keys for each cylinder, master and grand master keys as required by Owner.
- E. Manufacturer's:
 1. Best SFIC

2.05 TEMPLATES AND HARDWARE LOCATION:

- A. Furnish hardware made to template. Supply required templates and hardware locations to the door and frame manufacturer's.
- B. Furnish metal template to frame/door supplier for continuous hinge.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General:
 1. Install hardware according to manufacturer's installations and template dimensions. Attach all items of finish hardware to doors, frames, walls, etc. with fasteners furnished and required by the manufacturer of the item.

2. Provide blocking/reinforcement for all wall mounted Hardware.
3. Reinforced hollow metal doors and frames and reinforced aluminum door and frames will be drilled and tapped for machine screws.
4. Solid wood doors and frames: full thread wood screws. Drill pilot holes before inserting screws.
5. Continuous gear hinges attached to hollow metal doors and frames and aluminum doors and frames: 12-24 x 1/2" #3 Phillips Keenform self-tapping. Use #13 or 3/16 drill for pilot.
6. Continuous Gear Hinges require continuous mortar guards of foam or cardboard 1/2" thick x frame height, applied with construction adhesive.
7. Install weather-strip gasket prior to parallel arm closer bracket, rim exit device or any stop mounted hardware. Gasket to provide a continuous seal around perimeter of door opening. Allow for gasket when installing finish hardware. Door closers will require special templating. Exit devices will require adjustment in backset.

B. Installation of Access Control Components:

1. Electrical Contractor Provide all pathways (boxes and conduit) into doors and at wall mounted device locations (readers, wall actuators, REX motion detectors, etc.). Provide 120V power and connection to Automatic door power operators. Install and wire low voltage cabling for door operator wall actuator stations. Provide fire alarm circuit to future security access system for door lock interface.
2. General Trades/Access Control Supplier/Contractor: Provide all electrified door hardware. Hardware to be provided with quick-connect plugs between components (e.g. electrified panic plugs into power transfer) and pig tail connections at final device in the chain. Provide DPDT door position switches for all exterior doors and all card reader doors including wiring pigtails from switch. Provide Request To Exit switches in all electrified door hardware for alarm shunt. Provide wiring diagrams and power requirements for all hardware to be turned over to future security contractor.
 - a. Power supplies provided by the General Trades Contractor and installed by the Electrical Trades Contractor.
3. Security Contractor: Provide door hardware low voltage operating power from centralized power supplies. Provide all low voltage wiring connections at each door to the wiring pigtails provided by the general trades contractor. Provide all low voltage signal and power wiring to each controlled door from the door access system to be located in the Data Center. Provide low voltage wiring interface to all operators on access doors to interlock operator with door lock.

C. Locations:

1. Dimensions are from finish floor to center line of items.
2. Include this list in Hardware Schedule.
 - a. CATEGORY DIMENSION
 - b. Hinges Door Manufacturer's Standard
 - c. Levers Door Manufacturer's Standard
 - d. Exit Device Touchbar Per Template
 - e. Push-Pulls 46"
 - f. Push Plates 50" Centerline of Plate
 - g. Pull Plates 50" Centerline of Pull

D. Final Adjustment:

1. The general contractor shall provide the services of a representative to inspect material furnished and its installation and adjustment, and to instruct the Owner's personnel in adjustment, care and maintenance of hardware.

2. Locksets, closers and exit devices shall be inspected by the factory representative to insure correct installation and proper adjustment in operation. The manufacturer's representative shall prepare a written report stating compliance, and also recording locations and kinds of non-compliance. The original report shall be forwarded to the Architect with copies to the Contractor, hardware supplier, hardware installer and building owner.

E. Technical and Warranty Information:

1. At the completion of the project, the technical and warranty information coalesced and kept on file by the General Contractor shall be given to the Owner or Owner's Agent. In addition to both the technical and warranty information, all factory order acknowledgement numbers supplied to the General Contractor during the construction period shall be given to the Owner or Owner's Agent. The warranty information and factory order acknowledgement numbers shall serve to both expedite and properly execute any warranty work that may be required on the various hardware items supplied on the project.

F. HARDWARE SETS:

G. The hardware set represents 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.

H. Refer to Drawings for Hardware Sets and Door Assignments.

END OF SECTION

**SECTION 088000
GLAZING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Glazing units.
- B. Plastic films.
- C. Glazing compounds.

1.02 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).
- C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018 (Reapproved 2024).
- E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2025.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2025.
- G. GANA (SM) - GANA Sealant Manual; 2008.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data on Glazing Unit and Plastic Film Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- D. Manufacturer's qualification statement.
- E. Installer's qualification statement.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.05 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F (4 degrees C).
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Float Glass Manufacturers:
 - 1. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
 - 2. Guardian Glass, LLC: www.guardianglass.com/#sle.

3. Pilkington North America Inc: www.pilkington.com/na/#sle.
4. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.
5. Substitutions: See Section 016000 - Product Requirements.

2.02 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
 1. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
 2. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.

2.03 GLAZING UNITS

- A. Type G-1 - Monolithic Interior Decorative Glazing:
 1. Applications: Decorative panel at elevated platform casework.
 2. Glass Type: Fully tempered float glass.
 3. Tint: Clear.
 4. Thickness: 1/2" inch (____ mm), nominal.
 5. Apply decorative film across full face of panel
 - a. Owner shall provide artwork to create design on film
- B. Type G-2 - Monolithic Interior Vision Glazing:
 1. Applications: Interior glazing unless otherwise indicated.
 2. Glass Type: Fully tempered float glass.
 3. Tint: Clear.
 4. Thickness: 1/4 inch (6.4 mm), nominal.
 5. Glazing Method: Dry glazing method, gasket glazing.

2.04 PLASTIC FILMS

- A. Type F-1 - Decorative Plastic Film: Polyvinyl butyral (PVB) type.
 1. Application: Locations as indicated on drawings.
 2. Color: Acid Etch.
 3. Width: 36 inch (9.1 m).
 4. Manufacturers:
 - a. LLumar, an Eastman Chemical Company; Decorative Window Film, LLumar: www.llumar.com/#sle.
 - b. 3M Decorative Films.
 - c. Substitutions: See Section 016000 - Product Requirements.

2.05 GLAZING COMPOUNDS

- A. Type GC-1 - Polyurethane Sealant: Single component, chemical curing, nonstaining, nonbleeding; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35; color as selected.
- B. Manufacturers:
 1. Bostik Inc: www.bostik-us.com/#sle.
 2. Pecora Corporation: www.pecora.com/#sle.
 3. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.

2.06 ACCESSORIES

- A. Setting Blocks: EPDM, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) by width of glazing rabbet space minus 1/16 inch (1.5 mm) by height to suit glazing method and pane weight and area.

PART 3 EXECUTION**3.01 VERIFICATION OF CONDITIONS**

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 INSTALLATION - PLASTIC FILM

- A. Install plastic film with adhesive, applied in accordance with film manufacturer's instructions.
- B. Place without air bubbles, creases or visible distortion.
- C. Install film tight to perimeter of glass and carefully trim film with razor sharp knife. Provide 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) gap at perimeter of glazed panel unless otherwise required. Do not score the glass.

3.06 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.07 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

SECTION 092216
NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Metal partition and soffit framing.
- B. Framing accessories.

1.02 RELATED REQUIREMENTS**1.03 REFERENCE STANDARDS**

- A. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing; 2020.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
- D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2024.
- E. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2022.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate prefabricated work, component details, stud layout, framed openings, anchorage to structure, acoustic details, type and location of fasteners, accessories, and items of other related work.
 - 2. Describe method for securing studs to tracks, and for blocking and reinforcement of framing connections.
- C. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.
- D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- E. Manufacturer's qualification statement.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.
- B. Manufacturer Qualifications:
 - 1. Company specializing in manufacturing the types of products specified in this section, and with minimum 3 years of documented experience.
 - 2. Member of Steel Stud Manufacturers Association (SSMA): www.ssma.com/#sle.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Metal Framing, Connectors, and Accessories:
 - 1. ClarkDietrich; _____: www.clarkdietrich.com/#sle.

2. MarinoWARE; _____: www.marinoware.com/#sle.
3. SCAFCO Corporation; _____: www.scafco.com/#sle.
4. Substitutions: See Section 016000 - Product Requirements.

2.02 FRAMING MATERIALS

- A. Non-Loadbearing Framing System Components: AISI S220; sheet steel, of size and properties necessary for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf (L/240 at 240 Pa).
 1. Studs: C-shaped with flat faces.
 2. Studs: C-shaped with triangular-shaped, lipped holes.
 3. Runners: U-shaped, sized to match studs.
 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch (22 mm).
- B. Partition Head to Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and braced with continuous bridging on both sides.
- C. Non-Loadbearing Framing Accessories:
 1. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
 - a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
 - b. Height: 35-3/4 inches (908 mm).
 - c. Products:
 - 1) ClarkDietrich; Pony Wall (PW): www.clarkdietrich.com/#sle.
 - 2) Simpson Strong-Tie; RCKW Kneewall Connector: www.strongtie.com/#sle.
 - 3) Substitutions: See Section 016000 - Product Requirements.
 2. Flexible Wood Backing: Wood with sheet steel connectors.
 - a. Products:
 - 1) ClarkDietrich; Danback: www.clarkdietrich.com/#sle.
 - 2) Substitutions: See Section 016000 - Product Requirements.
 3. Sheet Metal Backing: 12 gauge, 0.0808 inch (2.05 mm) thick.
 4. Fasteners: ASTM C1002 self-piercing self-tapping screws.
 5. Acoustic Insulation: ASTM C665; preformed mineral-fiber, friction fit type, unfaced; thickness as required for STC.
 6. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

2.03 FABRICATION

- A. Fabricate assemblies of framed sections to sizes and profiles required.
- B. Fit, reinforce, and brace framing members to suit design requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that rough-in utilities are in proper location.

3.02 INSTALLATION OF STUD FRAMING

- A. Extend partition framing vertically as indicated in the Drawings by Partition Type.
- B. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs as indicated.

- C. Align and secure top and bottom runners at 24 inches (600 mm) on center.
- D. At partitions indicated with an acoustic rating:
- E. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.
- F. Align stud web openings horizontally.
- G. Secure studs to tracks using crimping method. Do not weld.
- H. Fabricate corners using a minimum of three studs.
- I. Install double studs at wall openings, door and window jambs, not more than 2 inches (50 mm) from each side of openings.
- J. Coordinate erection of studs with requirements of door frames; install supports and attachments.
- K. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.
- L. Blocking: Use wood blocking secured to studs. Provide blocking for support of wall cabinets, hardware, opening frames, and other locations as indicated in the Drawings and Section 061053.
- M. Furring: Install at spacing and locations shown on drawings. Lap splices a minimum of 6 inches (150 mm).

3.03 CEILING AND SOFFIT FRAMING

- A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.
- B. Install furring independent of walls, columns, and above-ceiling work.
- C. Securely anchor hangers to structural members or embed them in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.
- D. Space main carrying channels at maximum 72 inches (1 800 mm) on center, and not more than 6 inches (150 mm) from wall surfaces. Lap splice securely.
- E. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.
- F. Place furring channels perpendicular to carrying channels, not more than 2 inches (50 mm) from perimeter walls, and rigidly secure. Lap splices securely.

3.04 TOLERANCES

- A. Maximum Variation From True Position: 1/8 inch in 10 feet (3 mm in 3 m).
- B. Maximum Variation From Plumb: 1/8 inch in 10 feet (3 mm in 3 m).

END OF SECTION

SECTION 092710
GYPSUM BOARD REVEALS WITH INTEGRAL LED LIGHTING

PART 1 – GENERAL**1.01 SECTION INCLUDES**

- A. Aluminum extrusion with integrated LED lighting that is integrated into gypsum wallboard assemblies.

1.02 SUBMITTALS

- A. Product data: Indicate product description, including compliance with specified requirements and installation requirements. Mark manufacturer's brochures to include only those products proposed for use.
- B. Shop drawings indicating light locations, lengths, connections and controls. Indicate special installation conditions required, if any.

1.03 QUALITY ASSURANCE

- A. Applicable standards; standards of the following, as referenced herein:
 1. Aluminum Association (AA).
 2. American Society for Testing and Materials (ASTM).
 - a. Allowable tolerances in horizontal planes:
 - b. Variation from level: +1/8" in 12'-0".
 3. Variation in plane of adjacent wallboard panels prior to joint treatment: 1/16".
- B. Allowable tolerances in framed vertical construction.
 1. Position: +1/4" maximum variation from design position.
 2. Alignment: 1/8" in 8'-0"; 1/4" maximum in any continuous wall, line or surface.
 3. Surface smoothness: No joint or fastener location, roughness or blemish discernible after application of finish when viewed at any angle from a distance of 5'-0" under occupancy lighting conditions, with surface preparation as specified in Painting section. **

1.04 DELIVERY, STORAGE AND HANDLING

- A. Storage:
 1. Stack LED Reveals off floor on pallets or similar platforms providing continuous support to prevent sagging. Stack so that long lengths
 2. Handle material to prevent damage to surfaces, edges and ends of extruded metal items. DO NOT DAMAGE EXPOSED ENDS OF LED STRIPS. Reject and remove damaged material from site.
- B. Handle materials to prevent damage to surfaces, edges and ends of sheet metal items. Reject and remove damaged material from site.

PART 2 - PRODUCTS**2.01 MANUFACTURER:**

- A. Acceptable manufacturer; subject to compliance with specified requirements:
 1. Fry Reglet Corporation (Basis of Design)
 2. Substitutions: Refer to Section

2.02 MATERIALS AND FINISH:

- A. Clear Anodized finish (Standard):
 1. Architectural 200R1 medium etch (AA-M32c10A21), clear color.

2.03 LED REVEALS:

- A. LI Drywall Mid R4
 - 1. Acceptable Product: Number IULED
 - 2. Characteristics:
 - a. Description: LED Drywall Mid R4 shall create a lighted horizontal recessed reveal.
 - b. Material: Clear anodized extruded aluminum.
 - c. Lengths: As indicated on Drawings
 - d. LED Tape:
 - 1) Standard White - 8mm
 - e. Light wattage/ft.:
 - 1) Standard White - 1.5wt./ft.,3.0 wt./ft. or 6.0 wt./ft.**
 - f. Kelvin Temperature Specify:
 - 1) Standard White - 3500
 - g. Driver:
 - 1) Standard White - **DRV-CV96W24V4A, Constant Voltage 24V DC PWM Output - 100-277 VAC Input - 0-10V Dimming - 96W - Class 2** or **DRV-CV288W24V12A, Constant Voltage 24V DC PWM Output - 100-277 VAC Input - 0-10V Dimming - 288W 3 Output - Class 2** or **DRV-CV96WDELVMLV4A, 100-130VAC Input - 96W/24 VDC Output - Dimmable with Any Line Voltage Dimmer – Class 2**
 - 2) Variable White - **DRV-CV240WD10V5A, 2 Channel 0-10V Variable White dimming module**

PART 3 - EXECUTION**3.01 INSTALLATION:**

- A. Install LED gypsum wallboard accessories in accordance with manufacturer's product data and as follows:
- B. Fasten reveal through board to framing on 16" centers.
- C. Joint treatment: Finish joints and attachment flanges as specified in Gypsum Board Systems section.
- D. Dust surfaces and leave ready for decoration. Joint and fastener treatment shall be indistinguishable in finished work.
- E. Insert LED reveal in horizontal or vertical opening and install LED connectors.

3.02 PROTECTION

- A. Protect LED reveals from damage until date of Substantial Completion. Replace LED Reveals which become damaged.

END OF SECTION

**SECTION 095100
ACOUSTICAL CEILINGS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Suspended metal grid ceiling system.
- B. Acoustical units.
- C. Supplementary insulation above ceiling.

1.02 REFERENCE STANDARDS

- A. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- C. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2023.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning.
- C. Product Data: Provide data on suspension system components and acoustical units.
- D. Samples: Submit two samples 5 by 5 inch (____ by ____ mm)5 in size illustrating material and finish of acoustical units.
- E. Samples: Submit two samples each, 12 inches (____ mm) long, of suspension system main runner, cross runner, and perimeter molding.
- F. Manufacturer's qualification statement.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 016000 - Product Requirements, for additional provisions.
 2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.05 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Acoustic Tiles/Panels:

1. Armstrong World Industries, Inc: www.armstrongceilings.com/#sle.
2. Certainteed Architectural: www.certainteed.com/ceilings-and-walls/#sle.
3. USG Corporation: www.usg.com/#sle.

B. Suspension Systems:

1. Same as for acoustical units.

2.02 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Class A in accordance with ASTM E84.

2.03 ACOUSTICAL UNITS

- A. Acoustical Panels, ACT-1: Glass fiber with membrane-faced overlay, attached to suspended ceiling grid with baffle clips, with the following characteristics:
 1. Classification: ASTM E1264 Type B.
 2. Size: 24 by 24 inches (610 by 610 mm).
 3. Thickness: 1 inch (25 mm).
 4. Noise Reduction Coefficient (NRC) Range: 0.90 to ___, in accordance with ASTM E1264.
 5. Articulation Class (AC): 190, in accordance with ASTM E1264.
 6. Panel Edge: Reveal.
 7. Color: White.
 8. Suspension System, 9/16": Exposed.
 9. Products:
 - a. Armstrong World Industries, Inc; Lyra: #8361PB Basis of Design www.armstrongceilings.com/#sle.
- B. Acoustical Panels, ACT-2: Glass fiber with membrane-faced overlay, attached to suspended ceiling grid with baffle clips, with the following characteristics:
 1. Classification: ASTM E1264 Type B.
 2. Size: 12 by 96 inches (___ by ___ mm).
 3. Thickness: 1 inch (25 mm).
 4. Noise Reduction Coefficient (NRC) Range: 0.90 to 0.95, in accordance with ASTM E1264.
 5. Articulation Class (AC): 190, in accordance with ASTM E1264.
 6. Panel Edge: Reveal.
 7. Color: White.
 8. Suspension System, 9/16": Exposed.
 9. Products:
 - a. Armstrong World Industries, Inc; Lyra: #8379PB Basis of Design www.armstrongceilings.com/#sle.

2.04 SUSPENSION SYSTEMS

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold-down clips, stabilizer bars, clips, and splices as required.
- B. Exposed Suspension System: Hot-dip galvanized steel grid and cap.
 1. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
 2. Profile: Tee; 9/16 inch (14 mm) face width.
 3. Finish: Baked enamel.
 4. Color: White.

2.05 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Hanger Wire: 12 gauge, 0.08 inch (2 mm) galvanized steel wire.
- C. Perimeter Moldings: Same metal and finish as grid.
- D. Acoustical Insulation: ASTM C665 friction fit type, unfaced batts.
 - 1. Thickness: 2 inch (51 mm).
 - 2. Size: To fit acoustical suspension system.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- B. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
- C. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- D. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- E. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- F. Support fixture loads using supplementary hangers located within 6 inches (152 mm) of each corner, or support components independently.
- G. Do not eccentrically load system or induce rotation of runners.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- E. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.
- F. Where round obstructions occur, provide preformed closures to match perimeter molding.
- G. Lay acoustical insulation for a distance of 48 inches (1219 mm) either side of acoustical partitions.

3.04 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.05 CLEANING

- A. Clean surfaces.
- B. Replace damaged or abraded components.

END OF SECTION

SECTION 095126
LINEAR SOLID WOOD PANELS FOR CEILING

PART 1 - GENERAL**1.01 REFERENCE STANDARDS**

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023, with Editorial Revision (2024).
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2023.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.02 1.1 RELATED DOCUMENTS

- A. Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.03 1.2 SUMMARY

- A. Section Includes:
 1. Linear Solid Wood Panels
 2. Exposed grid suspension system.
 3. Wire hangers, fasteners, main runners, cross tees, wall angle moldings and accessories.

1.04 1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 1. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 2. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot- Dip Process.
 3. ASTM A 1008 Standard Specification for Steel, Sheet, and Cold Rolled Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 4. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
 5. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
 6. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 7. ASTM E 580 Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Seismic Restraint.
 8. ASTM C423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 9. ASTM E1264 Classification for Acoustical Ceiling Products.
 10. Hardwood Plywood & Veneer Association (HPVA)
 11. Ohio Building Code (current edition)
 12. ASHRAE Standard 62.1 2004 Ventilation for Acceptable Indoor Air Quality
 13. NFPA 70 National Electrical Code

14. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

1.05 1.4 SUBMITTALS

- A. Shop Drawings: Layout and details of ceilings. Show locations of items that are to be coordinated with or supported by the ceilings.
- B. Installation Instructions: Submit manufacturer's installation instructions as referenced in Part three, Installation.
- C. Product Data: Submit manufacturer's technical data for each type of ceiling unit and suspension system required.
- D. Samples for Verification: Samples of product, in specified finish, including associated acoustic backer and grid.
- E. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

1.06 1.5 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide ceiling panel units and grid components by a single manufacturer.
- B. Fire Performance Characteristics: Identify ceiling components with appropriate markings of applicable testing and inspecting organization.
 - 1. Surface Burning Characteristics: As follows, tested per ASTM E84 and complying with ASTM E1264 for Class C products.
 - 2. HPVA (Hardwood Plywood and Veneer Association) certification and audit program per ASTM E84 tunnel test.
- C. Woodworking Standards: Manufacturer must comply with specified provisions of Architectural Woodworking Institute quality standards.
- D. Coordination of Work: Coordinate ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, and electrical systems.

1.07 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store ceiling components in a dry interior location in their cartons prior to installation to avoid damage. Store cartons in a flat, horizontal position. The protectors between the panels should not be removed until installation.
- B. Do not store in unconditioned spaces with humidity greater than 55 percent or lower than 25 percent relative humidity and temperatures lower than 50 degrees Fahrenheit (10 degrees Celsius) or greater than 86 degrees Fahrenheit (30 degrees Celsius). Panels must not be exposed to extreme temperatures, for example, close to a heating source or near a window with direct sunlight.
- C. Handle ceiling units carefully to avoid chipped edges or damage to units in any way.

1.08 1.7 PROJECT CONDITIONS

- A. Wood ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. (Remove plastic wrap to allow panels to climatize).
- B. The wood panels should not be installed in spaces where the temperature or humidity conditions vary from the temperatures and conditions that will be normal in the occupied space.

C. As interior finish products, the solid wood panels are designed for installation in temperature conditions between 50 degrees Fahrenheit (10 degrees Celsius) and 86 degrees Fahrenheit (30 degrees Celsius), in spaces where the building is enclosed, and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.

1.09 1.8 WARRANTY

A. Linear Solid Wood Panels: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to:

1. Linear Solid Wood Panels: Defects in materials or factory workmanship.
2. Grid System: Rusting and manufacturing defects.

B. Warranty Period:

1. Linear Solid Wood Panels: One (1) year from date of installation.
2. Grid: Ten years from date of installation.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.10 1.9 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Ceiling Units: Furnish quality of full-size units equal to 2.0 percent of amount installed.
2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 1.0 percent of amount installed.

PART 2 - PRODUCTS

2.01 2.1 MANUFACTURERS

A. Basis of Design WoodWorks Linear Solid Wood Panels:

1. Armstrong World Industries, Inc. (Basis of Design)
2. USG
3. MDC Zintra

B. Suspension Systems:

1. Armstrong World Industries, Inc. (Basis of Design)
2. USG
3. MDC Zintra

2.02 2.2. WOOD CEILING UNITS

A. Ceiling Panels Type (WD-1):

1. Surface Texture: Smooth
2. Composition: Solid Wood (Poplar)
3. Finish: Tinted, UV Cured Topcoat Finishes on Solid Wood (Poplar)
 - a. Antique Oak (GAO)
4. Material IDs & Dimensions:
 - a. Dimensions:
 - b. Panel Width: 12-inch (Nominal)
 - c. Panel Length Size: With 1" reveal panel to panel @ lengths
 - 1) 96-inch (Nominal): 95-inch (Actual)

- d. Plank Height: 3/4 inch (19.05 mm)
- e. Panel Height: 1-1/4 inch (32 mm)
- f. Design Options & Material IDs:
 - 1) 8176W1____: 3-1/4" (Actual Plank Width) x 3/4" (Actual Plank Height) – 3 Planks at 12"x96"x1-1/4" (Nominal Panel Width X Nominal Panel Length X Nominal Panel Height)
- 5. Acoustical Performance Infill Options:
 - 1) Back Stage Noir - Item 1318
 - b. 8176W1: NRC 0.70, CAC 28
- 6. Flame Spread: Class C ASTM E84

ACCESSORIES:

- 1. 8ft Ledger item 6571____
- 2. Heavy Duty Wall Anchor – item 7100
- 3. Backer Clip – item 5687
- 4. Flat Backet Kit – item 7290GBL
- 5. Solid End-Stain
 - a. Match wood finish

3.02 2.2.1 SUSPENSION SYSTEMS

- A. Components: All main beams and cross tees shall be commercial quality hot dipped galvanized steel as per ASTM A653. Main beams and cross tees are double-web steel construction with 15/16-inch type exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
 - 1. Structural Classification: ASTM C635 (Heavy Duty).
 - 2. Color: Tech Black.
 - 3. Acceptable Product: Prelude XL 15/16" Exposed Tee Main beam item 7301BL, Prelude XL Exposed Tee item XL7341BL, Prelude XL Exposed Tee 2' item XL7328BL, and Prelude XL Exposed Tee 2' item XL8320BL as manufactured by Armstrong World Industries, Inc.
- B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
- C. Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least three times design load, but not less than 12 gauge.
- D. Accessories/Edge Moldings and Perimeter Trim:
 - 1. 4" Solid Wood Trim with 4 Clips
 - 2. Replacement Trim Clip
 - 3. Adjustable Trim Clip
 - 4. Accessories as needed to integrate lighting fixtures into ceiling system

PART 3 - EXECUTION**4.01 3.1 EXAMINATION**

- A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out.
- B. Proper designs for both supply air and return air, maintenance of the HVAC filters and building interior space are essential to minimize soiling. Before starting the HVAC system, make sure supply air is properly filtered and the building interior is free of construction dust.

4.02 3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.
- B. WoodWorks ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. (Remove plastic wrap to allow panels to climatize).

4.03 3.3 INSTALLATION

- A. Interior WoodWorks products, the solid wood panels are designed for installation in temperature conditions between 50 degrees Fahrenheit (10 degrees Celsius) and 86 degrees Fahrenheit (30 degrees Celsius), in spaces where the building is enclosed, and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.
- B. Install suspension system and panels in compliance with ASTM C636, ASTM E580, with the approval of the authorities having jurisdiction, and in accordance with the manufacturer's WoodWorks Linear Solid Wood Panels Installation Instructions.

4.04 3.4 ADJUSTING AND CLEANING

- A. Replace damaged and broken panels.
- B. Clean exposed surfaces of ceilings panels, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.

END OF SECTION

**SECTION 096500
RESILIENT FLOORING****PART 1 GENERAL****1.01 SECTION INCLUDES**

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

1.02 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2025.
- B. ASTM F1700 - Standard Specification for Solid Vinyl Floor in Modular Format such as Tile(s) or Plank(s); 2025.
- C. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021 (Reapproved 2025).
- D. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Verification Samples: Submit two samples, full size, illustrating color and pattern for each resilient flooring product specified.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Flooring Material: 1 case of each type and color.
 - 3. Extra Wall Base: 30 linear feet (_____ linear meters) of each type and color.

1.04 QUALITY ASSURANCE

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

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).
- C. Protect roll materials from damage by storing on end.

1.06 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).

PART 2 PRODUCTS**2.01 TILE FLOORING**

- A. Vinyl Tile - Type LVT: Printed film type, with transparent or translucent wear layer; acoustic interlayer or backing.
 - 1. Manufacturers:
 - a. ShawContract: 5mm direct glue = Basis of Design.
 - 1) Style Number = 0648V
 - 2) Style Name = Solitude
 - b. Patcraft
 - c. Miliken
 - 2. Minimum Requirements: Comply with ASTM F1700, Class III.
 - 3. Plank Tile Size: 6 inch by 48 inch inch (____ by ____ mm).
 - 4. Wear Layer Thickness: 0.020 inch (0.50 mm).
 - 5. Total Thickness: 0.20 inch (5 mm).
 - 6. Tile Edge: Straight.
 - 7. Color: As indicated on drawings.

2.02 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TP, rubber, thermoplastic; style as scheduled.
 - 1. Manufacturers:
 - a. Flexco Corporation: www.flexcofloors.com/#sle.
 - b. Roppe Corporation: www.roppe.com/#sle.
 - c. Tarkett Flooring: www.tarkett.com/#sle.
 - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 - 3. Height: 4 inches (100 mm).
 - 4. Thickness: 0.125 inch (3.2 mm).
 - 5. Profile: Standard toe
 - 6. Finish: Satin.
 - 7. Length: Roll.
 - 8. Color: As indicated on drawings.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
- C. Filler for Coved Base: Plastic.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).

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

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- C. Prohibit traffic until filler is fully cured.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Adhesive-Applied Installation:
 1. Fit joints and butt seams tightly.
 2. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- E. Install flooring prior to casework. Protect during the remainder of construction. Do not scribe flooring at base cabinets.
- F. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 1. Resilient Strips: Attach to substrate using adhesive.

3.04 INSTALLATION - TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.
- C. Install square tile to ashlar pattern. Allow minimum 1/2 full size tile width at room or area perimeter.

3.05 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches (45 mm) between joints.
- B. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.06 CLEANING

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

3.07 PROTECTION

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

END OF SECTION

**SECTION 096813
TILE CARPETING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Carpet tile, fully adhered.

1.02 REFERENCE STANDARDS

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2016 (Reapproved 2021).
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2025.
- C. CRI 104 - Standard for Installation of Commercial Carpet; 2018.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Shop Drawings: Indicate layout of joints.
- D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.
- G. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.04 QUALITY ASSURANCE

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

1.05 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Tile Carpeting:
 - 1. Interface, Inc: www.interface.com/#sle.
 - 2. Milliken & Company: www.milliken.com/#sle.
 - 3. Shaw: Basis of Design.
 - 4. Patcraft: Basis of Design.

2.02 MATERIALS

- A. Tile Carpeting: Tufted, manufactured in one color dye lot.
 - 1. Product: CPT-1 manufactured by patcraft.
 - 2. Tile Size: 18 inch by 36 inch inch (____ by ____ mm), nominal.
 - 3. Collection: Lithic
 - 4. Color: As indicated on Drawings.
 - 5. Fiber: 100% Solution Dyed Nylon
 - 6. Installation Pattern: Brick pattern.
 - 7. Tile Carpeting: Tufted, manufactured in one color dye lot.
 - 8. Product: CPT-2 manufactured by patcraft.
 - 9. Tile Size: 24 inch by 24 inch, nominal.
 - 10. Collection: Urban Relief
 - 11. Color: As indicated on Drawings.
 - 12. Fiber: 100% Solution Dyed Nylon
 - 13. Installation Pattern: Brick pattern.
- B. Tile Carpeting: Tufted, manufactured in one color dye lot.
 - 1. Product: CPT-3 manufactured by Shaw.
 - 2. Tile Size: 24 inch by 24 inch, nominal.
 - 3. Style Name: Grit Tile
 - 4. Style Number: 5T486
 - 5. Color: As indicated on Drawings.
 - 6. Fiber: 100% Solution Dyed Nylon
 - 7. Installation Pattern: Brick pattern.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- C. Vacuum clean substrate.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.

- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in specified pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Fully adhere carpet tile to substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. See Section 017000 - Execution and Closeout Requirements for additional requirements.
- B. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- C. Clean and vacuum carpet surfaces.

END OF SECTION

**SECTION 097200
WALL COVERINGS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Wall covering.

1.02 REFERENCE STANDARDS

- A. ASTM F793/F793M - Standard Classification of Wall Coverings and Ceiling Coverings by Use Characteristics; 2025.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on wall covering and adhesive.
- C. Shop Drawings: Indicate wall elevations with seaming layout.
- D. Samples: Submit two samples of wall covering, 8 inch by 10 inch (____ by ____ mm) in size illustrating color, finish, and texture.
- E. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Wall Covering Materials: 15 linear feet (____ linear m) of each color and pattern of wall covering; store where directed.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inspect roll materials at arrival on site, to verify acceptability.
- B. Protect packaged adhesive from temperature cycling and cold temperatures.
- C. Do not store roll goods on end.

1.06 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.
- B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.
- C. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surfaces.

PART 2 PRODUCTS**2.01 WALL COVERINGS**

- A. Wall Covering - Type WC-1: Fabric-backed vinyl roll stock.

1. Comply with ASTM F793/F793M, Category V, Type II.
2. Total Weight: 20 oz/sq yd (____ g/sq m).
3. Roll Width: 54 inches (____ mm).
4. Color: As indicated on Drawings.
5. Manufacturers:
 - a. Koroseal/RJF International: www.koroseal.com/#sle.
 - b. MDC Interior Solutions; MDC Type II Wallcoverings: www.mdcwall.com/#sle.
Basis of Design.
 - c. Designtex.
 - d. Substitutions: See Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are prime painted and ready to receive work, and comply with requirements of wall covering manufacturer.
- B. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet (3 mm in 3 m) nor vary at a rate greater than 1/16 inch/ft (1.5 mm/300 mm).

3.02 INSTALLATION

- A. Apply adhesive and wall covering in accordance with manufacturer's instructions.
- B. Apply adhesive to wall surface immediately prior to application of wall covering.
- C. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface.
- D. Butt edges tightly.
- E. Horizontal seams are not acceptable.
- F. Do not seam within 2 inches (50 mm) of internal corners or within 6 inches (150 mm) of external corners.
- G. Install wall covering before installation of bases and items attached to or spaced slightly from wall surface.
- H. Install wallcovering tight to aluminum extrusions with integral LED lighting.
- I. Install wallcovering over metal access panels where present.
- J. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet.
Wipe clean with dry cloth.

3.03 CLEANING

- A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.
- B. Reinstall wall plates and accessories removed prior to work of this section.

3.04 PROTECTION

- A. Do not permit construction activities at or near finished wall covering areas.

END OF SECTION

**SECTION 099000
PAINTING****PART 1 GENERAL****1.01 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; Current Edition.

1.02 RELATED DOCUMENTS

- A. All provisions of the Contract Documents apply to this Section. The Contractor for this Section shall be responsible for complete familiarity with same.

1.03 SCOPE OF WORK

- A. Preparation of surfaces for painting and finishing and for the painting and finishing of all exposed surfaces to receive one of the applications specified in this Section.
- B. Puttying set nail heads and repairing other blemishes in wood, gyp board and plaster.
- C. Priming and back priming of all wood surfaces.
- D. DPainting miscellaneous items in walls and ceilings, and any other items not otherwise specified.
- E. Painting all visible surfaces of light fixtures, grille work, mechanical and electrical equipment not painted or pre-finished.
- F. Painting of all exposed ductwork, piping, conduit, insulation, brackets and hangers unless noted otherwise.
- G. Painting portion of ductwork interior or other surfaces visible through grilles, flat black.
- H. Painting of prime painted surfaces that are exposed in the completed project, unless noted otherwise on the drawings or specifications.

1.04 WORK NOT INCLUDED OR SPECIFIED IN OTHER SECTIONS

- A. Shop priming specified in other Sections.
- B. Copper, brass, aluminum, stainless steel and other non-ferrous metals shall not be painted unless specifically noted otherwise.

1.05 SYSTEM DESCRIPTION

- A. Environmental Requirements
 - 1. Painting manufacturer and Contractor shall conform to State and local V.O.C. (Volatile Organic Compound) Regulations in area where Project is located.
 - a. VOC content shall be a maximum 340 gm/liter, for field applied finishes.

2.02 SUBMITTALS

- A. Before materials are ordered, submit a complete list of proposed materials for each type of product listed. When requested, submit product data and a complete specifications and samples of materials for approval.
- B. Samples:
 - 1. Color schedule will be furnished by the Architect prior to commencement of painting work, and from this the painting contractor shall prepare duplicate set of samples of treatments for all major surfaces.
 - 2. Samples shall each be made on material like that to be treated and the material shall be positioned, during execution of the sample, to simulate the job conditions, i.e., vertical, overhead horizontal, or below eye level horizontal.

3. When approved, samples will be so marked, with one set retained by Architect and one by painting contractor. Approved sample shall be strictly duplicated in the work. Additional coats, if required to reproduce approved samples, shall be applied by the Contractor without additional cost to the Owner.

2.03 QUALITY ASSURANCE

- A. Codes and Standards: Comply with pertinent codes and regulations.

2.04 EXTRA MATERIALS

- A. Provide Owner, at completion of job, with one (1) gallon (3.8L) of paint in each color selected. Paint to be supplied in tightly sealed containers labeled with color numbers as listed in the final color schedule.

PART 2 PRODUCTS

3.01 PAINT, GENERAL

- A. 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 manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
 1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
 2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
 3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
 4. Floor Coatings: VOC not more than 100 g/L.
 5. Shellacs, Clear: VOC not more than 730 g/L.
 6. Shellacs, Pigmented: VOC not more than 550 g/L.
- C. Colors: As indicated in a color schedule to be issued by the Architect at a later date.
- D. Materials: All paint, varnish, enamel, lacquer, and related materials shall be first quality standard products of established manufacturers who have continuous performance in the manufacture of each product for 10 years and approved by the Architect. Provide best quality, first line grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade, first line product will not be acceptable. All materials shall comply with the VOC Content requirements listed in this Section. The following manufacturers are acceptable:
 1. Sherwin-Williams
 2. Behr
 3. PPG
- E. All materials shall be delivered to the site in unopened original containers, bearing the brand name and the manufacturer's name, and having seals intact. Containers shall not be opened until contents are ready to be used.
- F. No materials shall be reduced or changed except as indicated by manufacturer's directions on containers.

- G. Thinners and dryers shall be added only in accordance with the manufacturer's printed instructions. Paints with solids shall be mixed at least 24 hours before use and shall be re-mixed before application. Turpentine shall conform to ASTM Standard Specifications D-13.
- H. In selecting painting materials, the Contractor shall take into consideration special atmospheric conditions prevailing and any excessive treatment to which the particular surfaces might be subject.
 - 1. All latex paints specified shall be 100% latex base.

3.02 PAINTING SCHEDULE

- A. Any surface visible in the completed project except floors and areas noted unpainted on the drawings, shall be painted in accordance with the following descriptions:
 - 1. Interior Surfaces:
 - 2. Gypsum Board
 - a. 1 coat primer
 - b. 2 coats low luster latex enamel
 - or for surfaces indicated on drawings to receive epoxy coating:
 - c. 1 coat latex wall sealer
 - d. 2 coats water based catalyzed epoxy paint
 - 3. Wood (except as noted)
 - a. 1 coat enamel primer
 - b. 2 coats alkyd semi-gloss enamel
 - 4. Fire Retardant Treated Plywood
 - a. 1 coat primer
 - b. 2 coats low luster Latex enamel
 - 5. Masonry
 - a. 1 coat block filler
 - b. 2 coats alkyd eggshell enamel
 - 6. Masonry (Epoxy system)
 - a. 1 coat block filler
 - b. 2 coats water based catalyzed epoxy-coating
 - 7. Fabricator or manufacturer primed Ferrous Metals
 - a. 2 coats interior alkyd semi-gloss enamel
 - b. 2 coats interior alkyd satin enamel
 - 8. Non-primed Ferrous Metals
 - a. 1 coat lead-free alkyd metal
 - b. 2 coats alkyd semi-gloss enamel

PART 3 EXECUTION

4.01 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Plaster: 12 percent.
 - 5. Gypsum Board: 12 percent.

- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Before commencing work on surfaces of any type, the Painting Contractor shall carefully inspect same and satisfy himself that they are dry and in all other respects suitable to receive the specified treatment. If the condition of any surface is such that it cannot be put in proper condition by normal preparatory methods, and arrangements for prompt correction cannot be made at once with the General Contractor, the Painting Contractor shall not undertake surface preparation and shall, instead, at once address a written request to the General Contractor for corrections which will provide an acceptable surface.
- E. Application of any coating to a surface will constitute acceptance of the surface by the Painting Contractor. If after treatment, the completed finish (or any portion thereof) blisters, checks, peel, or otherwise shows indication of dampness or other irregular condition of surface, the Painting Contractor shall, at his own expense, remove the applied treatment and refinish the part affected to the satisfaction of the Architect. (The Painting Contractor should determine dryness of all moisture-holding materials by use of a reliable electronic moisture meter).
- F. Each coat of material applied must be inspected and approved by the Architect before the application of the succeeding specified coat; otherwise, no credit for the concealed coat will be given and the Painting Contractor shall assume the responsibility to recoat the work in question. The Painting Contractor shall notify the Architect, when each coat is completed, for inspection.

4.02 USE OF PREMISES

- A. No plumbing fixture, open waste, drain, or vent pipe (or other pipe of any kind), shall be used to dispose of paint materials, used rags, waste, or other materials.
- B. New materials of all kinds, shall not be used as supports for planking and shall be thoroughly protected from damage at all times.
- C. Provide, erect and maintain all staging and scaffolding required for execution of the work, move when necessary at the option of the Architect, to permit installation of other work.
Remove from premises promptly at completion of work

4.03 PREPARATION AND APPLICATION

- A. Comply with manufacturer's written instructions and recommendations for preparation and application.
- B. Before painting is started in an area, finish carpentry, including correction and adjustments shall have been completed, all glazing installed and the area of the building cleaned of all debris, thoroughly broom cleaned and dusted out. All plastering and drywall shall be finished and shall be thoroughly dry.
- C. Finish hardware and plates for electric outlets shall have been fitted by the General and Electrical Contractors and shall be removed by and replaced by the Painting Contractor.
- D. Removable glazing stops that have been installed by the General Contractor shall be tagged for reinstallation, removed, painted, and reinstalled by the Painting Contractor.
- E. Door silencers that have been installed by the General Contractor shall be removed prior to the painting of the door frames and reinstalled by the Painting Contractor after the paint has dried and cured.
- F. Nail holes in all exposed woodwork shall be filled with putty colored to match accurately the approved finishes. Seal knots and pitch streaks before applying primer. Shellac on interior, spar varnish on exterior.

- G. Sandpapering of all wood joints and exposed wood surfaces shall follow paint priming or wood stain application on natural finish work and shall precede second coat work. Sand only with the grain.
- H. Metal surfaces shall be smooth and thoroughly cleaned of grease, rust, scale and dust. Shop coats that are marred or abraded shall be cleaned and touched up with primer matching the shop coat.
- I. When part will be exposed to view, sandpaper the entire treated area smooth, feather the edge of surrounding undamaged prime coat, and extend spot priming onto same, in a manner to eliminate evidence of repair.
- J. Before painting any metal, the surfaces shall be gone over carefully with body putty, if necessary, and sanded smooth.
- K. Unless the prime coat material to be used is recommended by its manufacturer for application over zinc-coated surfaces of the type at hand, after cleaning and any necessary de-glossing, only, surfaces must be given phosphate pre-treatment prior to application of prime coat; usual "vinegar etch" or acid pre-treatment (wash) will not be permitted.
- L. Phosphate Pre-Treatment: Crystalline zinc phosphate type; either "Lithoform", made by the American Chemical Paint Co., Ambler, Pa., or Galvaprep No. 5", made by Neilson Chemical Co., Detroit, Michigan as approved. Follow manufacturer's instructions and directions exactly, as to cleaning prior to treatment, application of treatment and after-rinse.
- M. Concrete Block Masonry:
 - 1. Prepare concrete block masonry surfaces by removing all efflorescence, dirt, rust, oil and grease stains, and method used shall be as determined by the Painting Contractor and paint manufacturer's representative. Surface must be acceptable before painting.
 - 2. Before first paint coat is applied, spot prime any nails and other exposed metal occurring in the surfaces with an oil base masonry primer as recommended by the paint manufacturer, to insure against rust.
- N. Plaster and drywall surfaces shall be sand-papered smooth, and scratches, cracks and abrasions shall be satisfactorily eliminated before priming. Spot seal "hot spots" after first coat has dried.
- O. Storage for paint materials, preparation and mixing shall be in well-lighted and ventilated central location; but shall not be allowed on finished floor. Oily rags and waste must be removed from building every night and must not be allowed to accumulate.
- P. Dropcloths shall be generously used and shall be carefully placed and secured over floor areas as the paint work progresses.
- Q. Adequate safeguards shall be provided against damage from the escape of materials during spray operation. Except that stains may be applied by cloth or sponge, all coatings shall be applied by brush or roller unless spray application is specifically named as acceptable, in description of required treatment.
- R. All adjoining surfaces, finish floors and fixtures shall be carefully protected throughout the painting operations against spray or splash stains, marks or other damage; and should such defacement occur as a result of the work, it shall be corrected in a manner acceptable and satisfactory to the Architect and without added cost to the Owner.
- S. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

- T. 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.
- U. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
 - 1. Mechanical Work:
 - a. Uninsulated metal piping.
 - b. Pipe hangers and supports.
 - c. Tanks that do not have factory-applied final finishes.
 - d. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 - e. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - f. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
 - 2. Electrical Work:
 - a. Electrical equipment that is indicated to have a factory-primed finish for field painting.
- V. 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.
- W. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

4.04 WORKMANSHIP

- A. All painting shall be done by skilled mechanics working under the supervision of a capable foreman and all workmanship shall be of the highest quality developing to fullest the possibilities of the materials and the processes specified.
- B. Materials shall be thoroughly stirred and evenly spread without runs, skips, sags, streaks, brush marks, or other defects. Paint shall be cut sharply to lines. Care shall be exercised to avoid lapping of paint over hardware. Painting around glazed openings shall be done promptly after putty is hard, but before shrinkage checks occur and shall seal the jointing of putty to glass.
- C. Do not paint over UL or FM labels.
- D. Not less than 24 hours between coats shall be allowed for drying, and painting, except as otherwise specified, shall not be allowed to proceed except on thoroughly dry surfaces. All painting application shall be in accordance with manufacturer's published specifications. All doors, cabinets and millwork shall be primed upon delivery to the site with stain or paint as required. All wood working shall be backprimed before it is installed.
- E. Exterior painting shall not be done during or immediately following raining or frosty weather or when the temperature is below 50°F, or likely to drop to freezing during drying. The application of treatments while surfaces are exposed to hot sun, or when temperature is above 90°F, or likely to be, during the drying period, shall be avoided.
- F. In using paste wood filler on open grain wood, allow sufficient time for "set" then wipe, first across grain, then with the grain, to secure a clean surface.

4.05 PAINTING APPLICATION

- A. The following are descriptions of painting applications. The manufacturer's products named below sets standard for products of other manufacturers listed under MATERIALS Paragraphs 1A and B, whose products shall be of equal to those listed below.
- B. Seal coats shall be tinted to final color. The first coat applied after the seal coat or primer (or first coat on shop primed surfaces), shall be full color as should be each subsequent coat.
- C. All interior and exterior work shall have a minimum of 3 coats (in addition to the specified primer). Provide additional coats as required for proper coverage. Approximately 25% of all painted areas to receive deep tint colors.
- D. Where metal to be painted has not already received a shop coat, it shall be cleaned and primed as directed by the Architect.
- E. The Architect reserves the right to change color before a coat is applied. Such changes if full coverage can be achieved, shall be done by the Contractor, without additional cost to the Owner.

END OF SECTION

**SECTION 099123
INTERIOR PAINTING****PART 1 GENERAL****1.01 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; Current Edition.

1.02 1.1 SCOPE OF WORK

- A. Preparation of surfaces for painting and finishing and for the painting and finishing of all exposed surfaces to receive one of the applications specified in this Section.
- B. Puttying set nail heads and repairing other blemishes in wood, gyp board and plaster.
- C. Priming and back priming of all wood surfaces.
- D. Painting miscellaneous items in walls and ceilings, and any other items not otherwise specified.
- E. Painting all visible surfaces of light fixtures, grille work, mechanical and electrical equipment not painted or pre-finished.
- F. Painting of all exposed structural steel, miscellaneous steel, roof support and structure, roof deck, ductwork, piping, conduit, insulation, brackets and hangers unless noted otherwise.
- G. Painting portion of ductwork interior or other surfaces visible through grilles.

1.03 1.2 WORK NOT INCLUDED OR SPECIFIED IN OTHER SECTIONS

- A. Shop priming specified in other Sections.
- B. Copper, brass, aluminum, stainless steel and other non-ferrous metals shall not be painted unless specifically noted otherwise.

1.3 SUMMARY

1. A. Qualitative requirements for surface preparation and the application of interior painting with opaque finishes, including painted mechanical and electrical identification, primers, sealers, and finish paints. For the following interior substrates:
 2. 1. Concrete.
 3. 2. Concrete masonry units (CMU).
 - a. Steel.
 - b. Galvanized metal.
 - c. Wood.
 - d. Gypsum board.
 - e. Plaster.

1.4 SUBMITTALS

1. A. Before materials are ordered, submit a complete list of proposed materials for each type of product listed. When requested, submit product data and a complete specifications and samples of materials for approval.
 - a. B. Samples:
 - 1) 1. Color schedule will be furnished by the Architect prior to commencement of painting work, and from this the painting contractor shall prepare duplicate set of samples of treatments for all major surfaces.
 - (a) 2. Samples shall each be made on material like that to be treated and the material shall be positioned, during execution of the sample, to simulate the

job conditions, i.e., vertical, overhead horizontal, or below eye level horizontal.

(b) 3. When approved, samples will be so marked, with one set retained by Architect and one by painting contractor. Approved sample shall be strictly duplicated in the work. Additional coats, if required to reproduce approved samples, shall be applied by the Contractor without additional cost to the Owner.

1.5 QUALITY ASSURANCE

a. A. Codes and Standards: Comply with codes and regulations.

1.6 EXTRA MATERIALS

1. A. Provide Owner, at completion of job, with five (5) gallons, in one (1) gallon containers, of the primary corridor paint and one (1) of the remaining type and colors of paint selected. Paint to be supplied in full tightly sealed containers labeled with color numbers as listed in the final color schedule.

PART 2 PRODUCTS

6.01 PAINT, GENERAL

1. Material Compatibility:

- 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.
- For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

VOC CONTENT OF FIELD-APPLIED INTERIOR PAINTS AND COATINGS: PROVIDE PRODUCTS THAT COMPLY WITH THE FOLLOWING LIMITS FOR VOC CONTENT, EXCLUSIVE OF COLORANTS ADDED TO A TINT BASE, WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24); THESE REQUIREMENTS DO NOT APPLY TO PAINTS AND COATINGS THAT ARE APPLIED IN A FABRICATION OR FINISHING SHOP:

FLAT PAINTS, COATINGS, AND PRIMERS: VOC CONTENT OF NOT MORE THAN 50 G/L.

- Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
- Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
- Floor Coatings: VOC not more than 100 g/L.
- Shellacs, Clear: VOC not more than 730 g/L.
- Shellacs, Pigmented: VOC not more than 550 g/L.
- C. Colors: As indicated in a color schedule.

8.02 2.2 MATERIALS

- A. All paint, varnish, enamel, lacquer, and related materials shall be first quality standard products of established manufacturers who have continuous performance in the manufacture of each product for 10 years and approved by the Architect. Provide best quality, first line grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade, first line product will not be acceptable. The following manufacturers are acceptable:
 1. Benjamin-Moore
 2. Pratt & Lambert
 3. Sherwin-Williams

- 4) 4. Porter Paint Company (Epoxy)
2. Other manufactures will be considered, providing performance regarding scrubability and hiding power are equal to or exceed manufactures listed above. Documentation of performance tests by an independent testing laboratory are required before approval.
 - a. B. Epoxy coatings shall be manufactured by Porter Paint Company.
- B. D. All materials shall be delivered to the site in unopened original containers, bearing the brand name and the manufacturer's name, and having seals intact. Containers shall not be opened until contents are ready to be used.
 1. No materials shall be reduced or changed except as indicated by manufacturer's directions on containers.
 2. F. Thinners and dryers shall be added only in accordance with the manufacturer's printed instructions. Paints with solids shall be mixed at least 24 hours before use and shall be remixed before application. Turpentine shall conform to ASTM Standard Specifications D-13.
 3. H. All latex paints specified shall be 100% latex base.

8.03 2.3 INTERIOR PAINTING SCHEDULE**8.04 A. CONCRETE SURFACES (SEMI-GLOSS): (LATEX)****8.05 1. PRIMER: LATEX WALL PRIMER, 1.0 - 1.2 MILS (0.03048 MM) DFT/COAT.****8.06 A. MANUFACTURERS:****8.07 1. SHERWIN WILLIAMS CO., PREPRITE 200 LATEX PRIMER B28W200****8.08 2. DEVOE PAINT CO., WONDER-PRIME MULTI-PURPOSE ACRYLIC LATEX PRIMER- SEALER, DR51701****8.09 3. PORTER PAINTS CO., #6010 PORTERLOCK WB ACRYLIC PIGMENTED SEALER****8.10 4. CORONADO PAINT CO., #948-11 SUPERKOTE 3000 VINYL ACRYLIC PRIMER****8.11 2. FINISH COATS: LATEX SEMI-GLOSS ENAMEL (34-45 UNITS AT 60 DEGREES FAHRENHEIT (15.56 DEGREES CELSIUS).), 2.0 - 2.4 MILS (0.06096 MM) DFT/COAT.****8.12 A. MANUFACTURERS:****8.13 1. SHERWIN WILLIAMS CO., PROMAR 200 LATEX SEMI-GLOSS B31W200****8.14 2. DEVOE PAINT CO., WONDER-TONES SEMI-GLOSS INTERIOR LATEX ENAMEL, DR39XX****8.15 3. PORTER PAINTS CO., #6139 PRO-MASTER 2000 SEMI-GLOSS INTERIOR LATEX****8.16 4. CORONADO PAINT CO., #32 SUPERKOTE 5000 ACRYLIC SEMI-GLOSS****8.17 3. SURFACES: CONCRETE WALLS.****8.18 B. CONCRETE MASONRY SURFACES (SEMI-GLOSS): (VINYL ACRYLIC LATEX SYSTEM)****8.19 1. PRIMER: VINYL ACRYLIC BLOCK FILLER.****8.20 A. MANUFACTURERS:****8.21 1. SHERWIN WILLIAMS CO., BLOCK FILLER B25W25****8.22 2. DEVOE PAINT CO., DEVOE-FILL ACRYLIC LATEX BLOCK FILLER, DV52903****8.23 3. PORTER PAINTS CO., #9203 QUICK FILL 900 INTERIOR EXTERIOR LATEX BLOCK FILLER****8.24 4. CORONADO PAINT CO., #946-11 SUPERKOTE 5000 LATEX BLOCK FILLER****8.25 2. FINISH COATS: VINYL ACRYLIC SEMI-GLOSS ENAMEL (25-35 UNITS AT 60 DEGREES FAHRENHEIT (15.56 DEGREES CELSIUS).), 1.5 DFT/COAT.****8.26 A. MANUFACTURERS:****8.27 1. SHERWIN WILLIAMS CO., PROMAR 200 SEMI-GLOSS B31W200****8.28 2. DEVOE PAINT CO., WONDER-SPEED SEMI-GLOSS LATEX ENAMEL, DR525XX****8.29 3. PORTER PAINTS CO., #6139 PRO-MASTER 2000 LATEX SEMI-GLOSS****8.30 4. CORONADO PAINT CO., #32 SUPERKOTE 5000 ACRYLIC SEMI-GLOSS****8.31 3. SURFACES: NEW MASONRY WALLS, GRAPHICS (DO NOT USE IN HIGH HUMIDITY AREAS).****8.32 C. METAL - FERROUS (SEMI-GLOSS): (ALKYD ENAMEL SYSTEM, MAXIMUM VOC CONTENT 450 GRAMS/LITER)****8.33 1. PRIMER: MODIFIED ALKYD RESIN PRIMER, 3 MILS (0.0762 MM) DFT/COAT.****8.34 A. MANUFACTURERS:**

8.35 1. SHERWIN WILLIAMS CO., KEM KROMIK UNIVERSAL PRIMER B50 SERIES

8.36 2. DEVOE PAINT CO., MIRROLAC-WB DTM FLAT PRIMER & FINISH, DP8502

8.37 3. PORTER PAINTS CO., #272 PORTERGUARD ALKYD METAL PRIMER

8.38 4. CORONADO PAINT CO., #35-11 ALKYD METAL PRIMER

8.39 2. FINISH COATS: ALKYD ENAMEL, SEMI-GLOSS (40-50 UNITS AT 60 DEGREES FAHRENHEIT (15.56 DEGREES CELSIUS).), 3.0 MILS (0.0762 MM) DFT/COAT.

8.40 A. MANUFACTURERS:

8.41 1. SHERWIN WILLIAMS CO., PROMAR 200 ALKYD SEMI-GLOSS B34W200

8.42 2. DEVOE PAINT CO., MIRROLAC-SPEED ALKYD SEMI-GLOSS ENAMEL, DR73XX

8.43 3. PORTER PAINTS CO., #149 PRO-MASTER 2000 ALKYD SEMI-GLOSS ENAMEL

8.44 4. CORONADO PAINT CO., #M13 POLYURETHANE SEMI-GLOSS ENAMEL

8.45 3. SURFACES: HOLLOW METAL DOORS, FRAMES, DOOR MULLIONS, RAILINGS, FERROUS METAL SURFACES.

8.46 D. METAL - GALVANIZED (SEMI-GLOSS): (ACRYLIC LATEX SYSTEM)

8.47 1. FINISH COATS: 100 PERCENT ACRYLIC, WATERBORNE, SEMI-GLOSS (30-40 UNITS AT 60 DEGREES FAHRENHEIT (15.56 DEGREES CELSIUS).), 3.0 MILS (0.0762 MM) DFT/COAT.

8.48 A. MANUFACTURERS:

8.49 1. SHERWIN WILLIAMS CO., METALATEX SEMI-GLOSS B42W100

8.50 2. DEVOE PAINT CO., MIRROLAC-WB DTM FLAT PRIMER & FINISH, DP8502

8.51 MIRROLAC-WB SEMI-GLOSS ENAMEL, DP83XX

8.52 3. PORTER PAINTS CO., #2809 PORTERGUARD DTM ACRYLIC SATIN ENAMEL

8.53 4. CORONADO PAINT CO., #90 RUST SCAT ACRYLIC SEMI-GLOSS

8.54 2. SURFACES: HOLLOW METAL DOORS, FRAMES, DOOR MULLIONS, RAILINGS, FERROUS METAL SURFACES.

8.55 E. WOOD - PAINTED (SEMI-GLOSS): (LATEX SYSTEM)

8.56 1. PRIMER: PIGMENTED INTERIOR MODIFIED ALKYD PRIMER, 2 MILS (0.0508 MM) DFT/COAT.

8.57 A. MANUFACTURERS:

8.58 1. SHERWIN WILLIAMS CO., PREPRITE CLASSIC LATEX PRIMER B28W101

8.59 2. DEVOE PAINT CO., VELOUR ALKYD ENAMEL UNDERCOAT, DR8801

8.60 3. PORTER PAINTS CO., #1129 BLANKIT INTERIOR ACRYLIC PRIMER

8.61 4. CORONADO PAINT CO., #37-11 SUPERKOTE 5000 ALKYD PRIMER

8.62 2. FINISH COATS: MODIFIED ALKYD SEMI-GLOSS ENAMEL (35-45 UNITS AT 60 DEGREES FAHRENHEIT (15.56 DEGREES CELSIUS).), 2.5 - 2.8 MILS (0.07112 MM) DFT/COAT.

8.63 A. MANUFACTURERS:

8.64 1. SHERWIN WILLIAMS CO., PRO CLASSIC WATERBORNE ACRYLIC B31SERIES

8.65 2. DEVOE PAINT CO., WONDER-SPEED SEMI-GLOSS ALKYD ENAMEL, DR509XX

8.66 3. PORTER PAINTS CO., #6139 PRO-MASTER 2000 LATEX SEMI-GLOSS ENAMEL

8.67 4. CORONADO PAINT CO., #90 RUST SCAT ACRYLIC SEMI-GLOSS

8.68 3. SURFACES: WOOD TRIM.

8.69 F. GYPSUM BOARD (FLAT): (ACRYLIC LATEX SYSTEM)

8.70 1. PRIMER: VINYL ACRYLIC LATEX, 1.1 MILS (0.02794 MM) DFT/COAT.

8.71 A. MANUFACTURERS:

8.72 1. SHERWIN WILLIAMS CO., PREPRITE 200 PRIMER B28W200

8.73 2. DEVOE PAINT CO., WONDER-TONES VINYL LATEX PRIMER-SEALER, DR50801

8.74 3. PORTER PAINTS CO., #567 MAX PRIME LATEX DRYWALL PRIMER

8.75 4. CORONADO PAINT CO., #948-11 SUPERKOTE 3000 VINYL ACRYLIC PRIMER

8.76 2. FINISH COATS: VINYL ACRYLIC FLAT (0-5 UNITS AT 90 DEGREES FAHRENHEIT (32.22 DEGREES CELSIUS).), 1.4 MILS (0.03556 MM) DFT/COAT.

8.77 A. MANUFACTURERS:

8.78 1. SHERWIN WILLIAMS CO., PROMAR 200 LATEX FLAT LATEX B30W200

8.79 2. DEVOE PAINT CO., WONDER-SPEED FLAT LATEX WALL PAINT, DR506XX

8.80 3. PORTER PAINTS CO., #9585 CEILING WHITE-FLAT

8.81 4. CORONADO PAINT CO., #28 SUPERKOTE VINYL ACRYLIC FLAT

8.82 3. SURFACES: CEILINGS, BULKHEADS

8.83 G. GYPSUM BOARD (EG-SHEL): (MODIFIED ALKYD SYSTEM - LOW V.O.C.)

8.84 1. PRIMER: VINYL ACRYLIC LATEX, 1.1 MILS (0.02794 MM) DFT/COAT.

8.85 A. MANUFACTURERS:

8.86 1. SHERWIN WILLIAMS CO., PREPRITE 200 PRIMER B28W200

8.87 2. DEVOE PAINT CO., WONDER-PRIME MULTI-PURPOSE ACRYLIC LATEX PRIMER-SEALER, DR51701

8.88 3. PORTER PAINTS CO., #867 PRO-MASTER 2000 LATEX PRIMER

8.89 4. CORONADO PAINT CO., #948-11 SUPERKOTE 3000 VINYL ACRYLIC PRIMER

8.90 2. FINISH COATS: MODIFIED ALKYD EG-SHEL (20-30 UNITS AT 60 DEGREES FAHRENHEIT (15.56 DEGREES CELSIUS).), 2.5 - 2.8 MILS (0.07112 MM) DFT/COAT.

8.91 A. MANUFACTURERS:

8.92 1. SHERWIN WILLIAMS CO., PROMAR 200 LOW VOC ALKYD B34WZ250

8.93 2. DEVOE PAINT CO., MIRROLAC-SPEED ALKYD EGGSHELL ENAMEL, DR72XX

8.94 3. PORTER PAINTS CO., #129 PRO-MASTER 2000 ALKYD SATIN

8.95 4. CORONADO PAINT CO., #25 SUPERKOTE 5000 ALKYD EGGSHELL

8.96 3. SURFACES: GYPSUM BOARD SURFACES, SUBJECT TO MODERATE ABUSE

8.97 H. EXPOSED STRUCTURE - FERROUS (FLAT): (WATERBORNE)

8.98 1. PRIMER

8.99 A. MANUFACTURERS:

1. SHERWIN WILLIAMS CO., DTM PRIMER/FINISH B66SERIES

9.01 2. DEVOE PAINT CO., MIRROLAC-WB DTM FLAT PRIMER & FINISH, DP8502

9.02 3. PORTER PAINTS CO., #212 PORTERGUARD DTM ACRYLIC PRIMER/FINISH

9.03 4. CORONADO PAINT CO., #35-11 ALKYD METAL PRIMER

9.04 2. FINISH COATS: ACRYLIC WATERBORNE (WHITE) FLAT (0-10 UNITS AT 60 DEGREES F.), 1 MIL (0.0254 MM) DFT/COAT.

9.05 A. MANUFACTURERS:

9.06 1. SHERWIN WILLIAMS CO., WATERBORNE ACRYLIC DRYFALL B42SERIES

9.07 2. DEVOE PAINT CO., MIRROLAC-WB DTM FLAT PRIMER & FINISH DO8502 (WHITE)

9.08 3. PORTER PAINTS CO., #9620 PORTERGUARD WB SPRAY DRY FOG FLAT LATEX

9.09 4. CORONADO PAINT CO., #28 SUPERKOTE VINYL ACRYLIC FLAT

9.10 3. SURFACES: EXPOSED METAL DECKING, TRUSSES, STRUCTURAL STEEL, METAL JOISTS.

9.11 I. EXPOSED STRUCTURE - GALVANIZED (FLAT): (WATERBORNE)

9.12 1. FINISH COATS: ACRYLIC WATERBORNE (WHITE) FLAT (0-10 UNITS AT 60 DEGREES F.), 1 MIL (0.0254 MM) DFT/COAT.

9.13 A. MANUFACTURERS:

9.14 1. SHERWIN WILLIAMS CO., WATERBORNE ACRYLIC FLAT B42SERIES

9.15 2. DEVOE PAINT CO., MIRROLAC-WB DTM FLAT PRIMER & FINISH, DP8502

9.16 3. PORTER PAINTS CO., #9620 PORTERGUARD WB SPRAY DRY FOG FLAT LATEX

9.17 4. CORONADO PAINT CO., #10 CRYLICOTE ACRYLIC FLAT

a. 2. Surfaces: Exposed metal decking, trusses, structural steel.

9.18 J. PROJECTION SCREEN PAINT

9.19 A. MANUFACTURER: PAINT ON SCREEN "S1 ULTIMATE" OR APPROVED EQUAL.

9.20 GAIN = 2.0

9.21 VIEWING ANGLE = 150 DEGREE CONE

9.22 RESOLUTION = HD 1080P, 4K CAPABLE

PART 3 EXECUTION

10.01 EXAMINATION

1. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

MAXIMUM MOISTURE CONTENT OF SUBSTRATES: WHEN MEASURED WITH AN ELECTRONIC MOISTURE METER AS FOLLOWS:

CONCRETE: 12 PERCENT.

- a. Masonry (Clay and CMU): 12 percent.
- b. Wood: 15 percent.
- c. Gypsum Board: 12 percent.

VERIFY SUITABILITY OF SUBSTRATES, INCLUDING SURFACE CONDITIONS AND COMPATIBILITY WITH EXISTING FINISHES AND PRIMERS.

BEFORE COMMENCING WORK ON SURFACES OF ANY TYPE, THE PAINTING CONTRACTOR SHALL CAREFULLY INSPECT SAME AND SATISFY HIMSELF THAT THEY ARE DRY AND IN ALL OTHER RESPECTS SUITABLE TO RECEIVE THE SPECIFIED TREATMENT. IF THE CONDITION OF ANY SURFACE IS SUCH THAT IT CANNOT BE PUT IN PROPER CONDITION BY NORMAL PREPARATORY METHODS, AND ARRANGEMENTS FOR PROMPT CORRECTION CANNOT BE MADE AT ONCE WITH THE GENERAL CONTRACTOR, THE PAINTING CONTRACTOR SHALL NOT UNDERTAKE SURFACE PREPARATION AND SHALL, INSTEAD, AT ONCE ADDRESS A WRITTEN REQUEST TO THE GENERAL CONTRACTOR FOR CORRECTIONS WHICH WILL PROVIDE AN ACCEPTABLE SURFACE.

APPLICATION OF ANY COATING TO A SURFACE WILL CONSTITUTE ACCEPTANCE OF THE SURFACE BY THE PAINTING CONTRACTOR. IF AFTER TREATMENT, THE COMPLETED FINISH (OR ANY PORTION THEREOF) BLISTERS, CHECKS, PEEL, OR OTHERWISE SHOWS INDICATION OF DAMPNESS OR OTHER IRREGULAR CONDITION OF SURFACE, THE PAINTING CONTRACTOR SHALL, AT HIS OWN EXPENSE, REMOVE THE APPLIED TREATMENT AND REFINISH THE PART AFFECTED TO THE SATISFACTION OF THE ARCHITECT. (THE PAINTING CONTRACTOR SHOULD DETERMINE DRYNESS OF ALL MOISTURE-HOLDING MATERIALS BY USE OF A RELIABLE ELECTRONIC MOISTURE METER.

EACH COAT OF MATERIAL APPLIED MUST BE INSPECTED AND APPROVED BY THE ARCHITECT BEFORE THE APPLICATION OF THE SUCCEEDING SPECIFIED COAT; OTHERWISE, NO CREDIT FOR THE CONCEALED COAT WILL BE GIVEN AND THE PAINTING CONTRACTOR SHALL ASSUME THE RESPONSIBILITY TO RECOAT THE WORK IN QUESTION. THE PAINTING CONTRACTOR SHALL NOTIFY THE ARCHITECT, WHEN EACH COAT IS COMPLETED, FOR INSPECTION.

16.01 3.2 USE OF PREMISES

16.02 A. NO PLUMBING FIXTURE, OPEN WASTE, DRAIN, OR VENT PIPE (OR OTHER PIPE OF ANY KIND), SHALL BE USED TO DISPOSE OF PAINT MATERIALS, USED RAGS, WASTE, OR OTHER MATERIALS.

16.03 B. WATER CLOSETS, TUBS, OTHER FIXTURES OF ALL KINDS, SHALL NOT BE USED AS SUPPORTS FOR PLANKING AND SHALL BE THOROUGHLY PROTECTED FROM DAMAGE AT ALL TIMES.

- a. C. Provide, erect and maintain all staging and scaffolding required for execution of the work, move when necessary at the option of the Architect, to permit installation of other work. Remove from premises promptly at completion of work.

3.3 PREPARATION AND APPLICATION

1. Before painting is started in an area, finish carpentry, including correction and adjustments shall have been completed, all glazing installed and the area of the building cleaned of all debris, thoroughly broom cleaned and dusted out. All plastering and drywall shall be finished and shall be thoroughly dry.

FINISH HARDWARE AND PLATES FOR ELECTRIC OUTLETS THAT HAVE BEEN FITTED BY THE GENERAL AND ELECTRICAL CONTRACTORS, SHALL BE REMOVED BY AND REPLACED BY THE PAINTING CONTRACTOR.

NAIL HOLES IN ALL EXPOSED WOODWORK SHALL BE FILLED WITH PUTTY COLORED TO MATCH ACCURATELY THE APPROVED FINISHES. SEAL KNOTS AND PITCH STREAKS BEFORE APPLYING PRIMER. SHELLAC ON INTERIOR, SPAR VARNISH ON EXTERIOR.

SANDPAPERING OF ALL WOOD JOINTS AND EXPOSED WOOD SURFACES SHALL FOLLOW PAINT PRIMING OR WOOD STAIN APPLICATION ON NATURAL FINISH WORK AND SHALL PRECEDE SECOND COAT WORK. SAND ONLY WITH THE GRAIN.

METAL SURFACES SHALL BE SMOOTH AND THOROUGHLY CLEANED OF GREASE, RUST, SCALE AND DUST. SHOP COATS THAT ARE MARRED OR ABRADED SHALL BE CLEANED AND TOUCHED UP WITH PRIMER MATCHING THE SHOP COAT.

WHEN PART WILL BE EXPOSED TO VIEW, SANDPAPER THE ENTIRE TREATED AREA SMOOTH, FEATHER THE EDGE OF SURROUNDING UNDAMAGED PRIME COAT, AND EXTEND SPOT PRIMING ONTO SAME, IN A MANNER TO ELIMINATE EVIDENCE OF REPAIR.

BEFORE PAINTING ANY METAL, THE SURFACES SHALL BE GONE OVER CAREFULLY WITH BODY PUTTY, IF NECESSARY, AND SANDED SMOOTH.

- a. Unless the prime coat material to be used is recommended by its manufacturer for application over zinc-coated surfaces of the type at hand, after cleaning and any necessary de-glossing, only, surfaces must be given phosphate pre-treatment prior to application of prime coat; usual "vinegar etch" or acid pre-treatment (wash) will not be permitted.
2. Phosphate Pre-Treatment: Crystalline zinc phosphate type; either "Lithoform", made by the American Chemical Paint Co., Ambler, Pa., or Galvaprep No. 5", made by Neilson Chemical Co., Detroit, Michigan as approved. Follow manufacturer's instructions and directions exactly, as to cleaning prior to treatment, application of treatment and after-rinse.
3. Concrete Block Masonry:
 - a. 1. Prepare concrete block masonry surfaces by removing all efflorescence, dirt, rust, oil and grease stains, and method used shall be as determined by the Painting Contractor and paint manufacturer's representative. Surface must be acceptable before painting.
 - b. Before first paint coat is applied, spot prime any nails and other exposed metal occurring in the surfaces with an oil base masonry primer as recommended by the paint manufacturer, to insure against rust.

DRYWALL SURFACES SHALL BE SAND-PAPERED SMOOTH, AND SCRATCHES, CRACKS AND ABRASIONS SHALL BE SATISFACTORILY ELIMINATED BEFORE PRIMING. SPOT SEAL "HOT SPOTS" AFTER FIRST COAT HAS DRIED.

STORAGE FOR PAINT MATERIALS, PREPARATION AND MIXING SHALL BE IN WELL-LIGHTED AND VENTILATED CENTRAL LOCATION; BUT SHALL NOT BE ALLOWED ON FINISHED FLOOR. OILY RAGS AND WASTE MUST BE REMOVED FROM BUILDING EVERY NIGHT AND MUST NOT BE ALLOWED TO ACCUMULATE.

DROPCLOTHS SHALL BE GENEROUSLY USED AND SHALL BE CAREFULLY PLACED AND SECURED OVER FLOOR AREAS AS THE PAINT WORK PROGRESSES.

ADEQUATE SAFEGUARDS SHALL BE PROVIDED AGAINST DAMAGE FROM THE ESCAPE OF MATERIALS DURING SPRAY OPERATION. EXCEPT THAT STAINS MAY BE APPLIED BY CLOTH OR SPONGE, ALL COATINGS SHALL BE APPLIED BY BRUSH OR ROLLER UNLESS SPRAY APPLICATION IS SPECIFICALLY NAMED AS ACCEPTABLE, IN DESCRIPTION OF REQUIRED TREATMENT.

ALL ADJOINING SURFACES, FINISH FLOORS AND FIXTURES SHALL BE CAREFULLY PROTECTED THROUGHOUT THE PAINTING OPERATIONS AGAINST SPRAY OR SPLASH STAINS, MARKS OR OTHER DAMAGE; AND SHOULD SUCH DEFACEMENT OCCUR AS A RESULT OF THE WORK, IT SHALL BE CORRECTED IN A MANNER ACCEPTABLE AND SATISFACTORY TO THE ARCHITECT AND WITHOUT ADDED COST TO THE OWNER.

CLEAN SUBSTRATES OF SUBSTANCES THAT COULD IMPAIR BOND OF PAINTS, INCLUDING DIRT, OIL, GREASE, AND INCOMPATIBLE PAINTS AND ENCAPSULANTS.

REMOVE INCOMPATIBLE PRIMERS AND REPRIME SUBSTRATE WITH COMPATIBLE PRIMERS AS REQUIRED TO PRODUCE PAINT SYSTEMS INDICATED.

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.

PAINTING MECHANICAL AND ELECTRICAL WORK: PAINT ITEMS EXPOSED IN EQUIPMENT ROOMS AND OCCUPIED SPACES INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:

a. Mechanical Work:

UNINSULATED METAL PIPING.

PIPE HANGERS AND SUPPORTS.

TANKS THAT DO NOT HAVE FACTORY-APPLIED FINAL FINISHES.

VISIBLE PORTIONS OF INTERNAL SURFACES OF METAL DUCTS, WITHOUT LINER, BEHIND AIR INLETS AND OUTLETS.

DUCT, EQUIPMENT, AND PIPE INSULATION HAVING COTTON OR CANVAS INSULATION COVERING OR OTHER PAINTABLE JACKET MATERIAL.

MECHANICAL EQUIPMENT THAT IS INDICATED TO HAVE A FACTORY-PRIMED FINISH FOR FIELD PAINTING.

a. Electrical Work:

- 1) a. Electrical equipment that is indicated to have a factory-primed finish for field painting.

**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.**

**AT COMPLETION OF CONSTRUCTION ACTIVITIES OF OTHER TRADES, TOUCH UP
AND RESTORE DAMAGED OR DEFACED PAINTED SURFACES.**

3.4 WORKMANSHIP

- (a) A. All painting shall be done by skilled mechanics working under the supervision of a capable foreman and all workmanship shall be of the highest quality developing to fullest the possibilities of the materials and the processes specified.
- (b) B. Materials shall be thoroughly stirred and evenly spread without runs, skips, sags, streaks, brush marks, or other defects. Paint shall be cut sharply to lines. Care shall be exercised to avoid lapping of paint over hardware. Painting around glazed openings shall be done promptly after putty is hard, but before shrinkage checks occur and shall seal the jointing of putty to glass.
 - (1) C. Tops and bottoms of all wood doors shall have at least 3-finish coats. Do not paint over UL or FM labels.
 - (2) D. Not less than 24 hours between coats shall be allowed for drying, and painting, except as otherwise specified, shall not be allowed to proceed except on thoroughly dry surfaces. All painting application shall be in accordance with manufacturer's published specifications. All doors, cabinets and millwork shall be primed upon delivery to the site with stain or paint as required. All wood working shall be backprimed before it is installed.
 - (3) E. Interior work shall be done only when the building has been thoroughly dried out, by natural or artificial heat, and when the work area is properly heated and ventilated, clean and as nearly dust-free as possible. Apply interior finishes only when a room temperature of at least 60°F can be maintained during application of treatments and until coatings are dry (for application of stains and similar treatments, a temperature of at least 75°F).

3.5 PAINTING APPLICATION

- (1) A. Seal coats shall be tinted to final color. The first coat applied after the seal coat or primer (or first coat on shop primed surfaces), shall be full color as should be each subsequent coat.
- (2) B. All interior work shall have a minimum of 2 finish coats (in addition to the specified primer). Provide additional coats as required for proper coverage. Approximately 25% of all painted areas to receive deep tint colors.
- (3) C. Where metal to be painted has not already received a shop coat, it shall be cleaned and primed as directed by the Architect.
- (4) D. The Architect reserves the right to change color before a coat is applied. Such changes if full coverage can be achieved, shall be done by the Contractor, without additional cost to the Owner.

END OF SECTION

**SECTION 123600
COUNTERTOPS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Countertops for architectural cabinet work.
- B. Wall-hung counters.
- C. Partial height partition cap.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- D. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- E. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- F. PS 1 - Structural Plywood; 2023.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.
- D. Verification Samples: For each finish product specified, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- E. Installer's qualification statement.
- F. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.05 FIELD CONDITIONS

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

PART 2 PRODUCTS**2.01 COUNTERTOPS**

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
 - 1. Flat Sheet Thickness: 1/2 inch (12 mm), minimum.
 - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Manufacturers:
 - 1) Dupont: www.corian.com/#sle.
 - 2) Formica Corporation; _____: www.formica.com/#sle.
 - 3) Wilsonart; _____: www.wilsonart.com/#sle.
 - b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - c. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
 - d. Color and Pattern: As indicated.
 - 1) Corian: Stonique
 - 2) Formica: Blanco Terrazzo
 - 3) Wilsonart: Avalanche Melange
 - 3. Other Components Thickness: 1/2 inch (12 mm), minimum.
 - 4. Exposed Edge Treatment - Counters: Built up to minimum 1-1/4 inch (32 mm) thick; square edge; use marine edge at sinks.
 - 5. Exposed Edge Treatment - Wall cap: Eased edge
 - 6. Back and End Splashes: Same sheet material, square top; minimum 4 inches (102 mm) high.
 - 7. Fabricate in accordance with manufacturer's standard requirements.

2.02 MATERIALS

- A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch (19 mm) thick; join lengths using metal splines.
- B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- C. Joint Sealant: Mildew-resistant silicone sealant, As selected by Architect.

2.03 ACCESSORIES

- A. Fixed Top-Mounted Countertop Support Brackets:
 - 1. Material: Steel.
 - 2. Finish: Manufacturer's standard, factory-applied, textured powder coat.
 - 3. Color: Black.
 - 4. Products:
 - a. Rakks: Concealed EH support bracket.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.04 FABRICATION

- A. Fabricate tops, splashes and wall caps in the largest sections practicable, with top surface of joints flush.

1. Join lengths of tops using best method recommended by manufacturer.
2. Fabricate to overhang fronts and ends of cabinets 1 inch (25 mm) except where top butts against cabinet or wall.
3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 2. Height: 4 inches (102 mm), unless otherwise indicated.
- C. Wall-Mounted Counter: Provide brackets as indicated on drawings, spaced as required to meet solid surface support requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Securely attach countertops to support brackets using concealed fasteners. Make flat surfaces level; shim where required.
- C. Securely attach wall caps to partition using concealed fasteners or manufacturer's recommended adhesive. Make flat surfaces level; shim where required.
- D. Seal joint between back/end splashes and vertical surfaces.

3.03 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet (3 mm in 3 m), maximum.
- B. Offset From Wall, Countertops: 1/8 inch (3 mm) maximum; 1/16 inch (1.5 mm) minimum.
- C. Field Joints: 1/8 inch (3 mm) wide, maximum.

3.04 CLEANING

- A. Clean countertops surfaces thoroughly.

3.05 PROTECTION

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

END OF SECTION

SECTION 220501.00 - COMMON WORK RESULTS FOR PLUMBING**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

A. Shop Drawings

1. Coordination Drawings: This contractor shall provide necessary coordination drawings required to make sure all disciplines are coordinated and fit into specified spaces (i.e. ceilings, chases, and all others). It is the work of the contractor to prepare complete coordination drawings indicating exact location, clearances and penetrations of all items of all trades.

1.2 GENERAL DIRECTION

A. Submittal of a bid indicates that the contractor has examined the drawings, specifications, and had an opportunity to visit the site to be able to provide a comprehensive complete bid.

B. The intent of these specifications and the accompanying drawings is to provide complete and workable systems as shown, specified and required by applicable codes. Interpret these specifications in conjunction with the drawings and provide all work described. If work is shown on drawings and not mentioned in the specifications, or vice versa, it is to be included in the work the same as though clearly set forth by both. Should there be a conflict between the specifications and drawings, provide the greater quantity or better quality. Immediately notify owner's representative and design professional of such conflicts.

C. The drawings that accompany these specifications are diagrammatic and although size and location of equipment is drawn to scale wherever possible make use of submittal data and verify all dimensions on site. Drawings may not reflect every offset, bend, tee, or elbow which may be required to install work in the space provided and avoid conflicts. Follow the drawings as closely as is practical and install additional bends, offsets and elbows where required by site conditions and codes at no additional cost. Install all new work in such manner as to conform to the structure, avoid obstructions, provide required service clearances and preserve headroom. Do not scale from drawings, all measurements should be taken in the field.

D. Coordinate all work with all other contractors and installers in addition to existing building obstructions and install accordingly. Comply with requirements of architectural drawings including but not limited to mounting height and locations. Fully research peculiarities and limitations of space available for installation of work with materials being provided. Work around material lead times to not extend project schedule.

E. Complete work, or part(s) thereof, at times as may be designated by the Owner's Representative, so that it can be used for temporary or permanent use. Do not construe such use of the system as an acceptance of it by Owner.

F. During mobilization or construction, if an abnormal condition is uncovered either with existing conditions, equipment loads, submittal data, etc. bring these to the attention of the Design Professional for review.

G. Owner's Representative or Design Professional may relocate devices prior to installation within a 20-foot limit at no additional charge.

H. All piping shall be run as straight as possible and symmetrical with architectural items. Piping shall be concealed in pipe shafts, pipe spaces and furring wherever possible. Piping installed before coordination with the other trades will be done at the contractor's risk.

1.3 GENERAL STANDARDS

A. Provide materials, installation methods, workmanship, testing, etc., in strict accordance with the latest edition of applicable standards and adopted codes, including (but not limited to) the following.

1. State and/or local Building Codes.
2. State and/or local Plumbing Codes.
3. American Society of Test Materials (ASTM)
4. Underwriters Laboratories (UL)
5. American Gas Association (AGA)
6. National Sanitation Foundation (NSF)
7. American National Standards Institute (ANSI)
8. National Electric Code (NEC)
9. Building Code Seismic Relative Displacement Requirements

1.4 PERMITS AND REGULATIONS

A. Obtain and pay for permits, fees, certificates of inspection and approval, etc. required for this branch of the work. Furnish Owner with certificates of final inspection and approval prior to final acceptance of this branch of the work.

B. Laws and regulations which bear upon or affect the various branches of this work shall be complied with by this contractor and are hereby made a part of this contract.

1.5 DEFINITIONS

A. Furnish - Procure, supply and deliver to project site, ready for installation, install and warrant (unless indicated otherwise on documents). Include warranty expenses.

B. Install - To supply labor, tools and incidental materials necessary to handle, store, mount, terminate, program, configure and adjust a product in order render the respective product and system fully operational and usable to the Owner for the intended purpose

C. Provide - Furnish and Install. Similar Terms: "include", "shall", "equip with", "consisting of".

D. Equal or Equivalent - Determination of equivalency to be made by design professional for all products not listed as basis-of-design.

E. Substantial Completion - Where frontend documentation does not define, products and systems must be fully installed as designed, tested, adjusted, labeled, and functionally demonstrated to owner.

1.6 REQUESTS FOR INFORMATION

A. Submit all questions, requests for information (RFIs) and similar queries through the formally-established RFI process for the project that has been accepted by the Owner's Representative,

Design Professionals, Prime Contractor and subcontractors. Submit as a PDF file. Do not submit as text in an email.

1.7 AVAILABILITY OF ELECTRONIC DRAWINGS

- A. If expressly permitted by the Owner and the terms of the Contract, editable electronic drawings may be made available for the creation of shop and as-built drawings upon request. Drawings will be made available at the discretion of the Engineer.
- B. "Request Drawings" form can be accessed, filled out and submitted at <http://www.klhengrs.com> (right hand side of page - Contractor Resources). Direct access to this form can be found here: <https://apps.klhengrs.com/drawingrequests>

1.8 QUALITY ASSURANCE

- A. Contractor shall have a minimum five (5) years experience in the installation of systems similar to the systems specified. Contractor, if requested, shall demonstrate his ability to perform all work to be included under the contract. Assurance if requested, shall be in the form of a list of past projects of similar size and complexity and a list of six (6) references pertaining to those projects. Failure to demonstrate these quality assurances shall be taken as a statement of the contractor's inability to perform.

1.9 WARRANTY / GUARANTEE

- A. Provide a warranty/guarantee in written form as part of O&M manual stating that all work, materials, equipment and parts are warranted to be free of defect for a minimum period of one year from the date of Substantial Completion. Warranty period and requirements may be expanded in drawings or subsequent specification sections. Repair or replace (owner's option) any defects or failures at no cost to the owner within the warranty period. Issues arising within warranty period must be attended to in a timely manner and in no case exceed four (4) working days. State this in writing as part of O&M manual. Replace defective items to the satisfaction of the Owner's Representative and the Design Professional.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Provide materials that are new, full weight, and of the best quality. Obtain equipment, components and materials from single manufacturer for products of the same kind or category. Provide materials that are listed and labeled and marked for intended location and application.
- B. Provide basis of design products or listed products equivalent in quality, performance, aesthetics, and product support (factory and local) to that specified as basis of design. Products not basis of design are subject to review by the Design Professional and possible rejection. Listing of a product manufacturer by name alone as an equivalent manufacturer shall not equate all products offered by that manufacturer to the basis of design.
- C. Bear all costs incurred from deviation from basis-of-design materials, methods, labor, services, etc. Use of materials, methods, labor, services, etc. that deviate from the basis-of-design will be considered a statement that capacities, requirements, clearances, arrangements, performance,

etc. have been checked, verified, found satisfactory, and align with intent of specified work and applicable codes and regulations.

- D. Should deviation from basis of design equipment impact other contractors scope of work it shall be the responsibility of this contractor to coordinate with and cover these costs in addition to their own. This specifically includes electrical deviations from basis of design.
- E. All manufacturer or contractor provided electrical disconnect switches shall comply with current National Electric Code requirements and rated to meet or exceed the overcurrent device serving the equipment.
- F. Products shall not contain asbestos, lead, mercury, or mercury compounds and shall be suitable for piping service fluids, materials, working pressures, and working temperatures. Potable-water piping and components shall be deemed lead-free and comply with NSF 61 and NSF 14.

PART 3 - EXECUTION

3.1 GENERAL DIRECTION

- A. Unless specifically indicated, provide all specified and drawn work as required to render all equipment and systems fully operational, including all ancillary, accessory, and support work. Install equipment and materials in strict accordance with manufacturer's written instructions.
- B. In cases where products / materials are furnished by Owner or others, provide the following services: receive, transport and securely store materials on site; remove materials and components from packaging; assemble all materials and components per factory instructions; install, wire and connect materials and components as recommended by manufacturer for a fully operational installation.
- C. Remove and replace items that impede new work installation including but not limited to fencing, doors, gypsum, lift-out panels, and structures to provide pathway for moving equipment into place.
- D. Examine surfaces to receive products for suitable mounting conditions and verify compliance with installation tolerances and other conditions affecting performance of the work. Proceed with installation only after unsatisfactory conditions have been corrected.
- E. Equipment shall be installed in accordance with manufactures installation recommendations. Provide and maintain service, maintenance and operating clearances as required by the manufacturer.

3.2 SUPERVISION AND WORKMANSHIP

- A. Workmanship throughout shall conform to the standards of best practice and all labor employed must be competent and qualified to do all the work required.
- B. Contractor shall furnish the services of an experienced superintendent to be in constant charge of the work at all times. The superintendent's qualifications are subject to the review and acceptance by the Owner's Representative. Utilize the same plumbing superintendent throughout the duration of the project.

- C. Provisions shall be made for owner's representative or design professional to make rough-in and open ceiling inspections prior to covering up work.
- D. Coordinate sizes and locations of concrete bases with architectural and structural elements. Concrete base shall be provided with all equipment provided.
- E. Protect all piping, fixtures, and equipment exposed to physical damage.
- F. Handling Flammable Liquids: Remove and dispose of liquids from existing gas piping according to requirements of authorities having jurisdiction.

3.3 PROJECT CONDITIONS

- A. Do not interrupt existing utility service(s) to any facility occupied by Owner or others until notification of no fewer than seven days in advance of proposed interruption of existing utility has been submitted to the Architect, Construction Manager, and/or Owner for approval. It is the contractor's responsibility to obtain written permission from the Architect and/or Owner prior to any interruptions of service. Failure to perform the above shall result in contractor proceeding at their risk and accepting full responsibility for incorrect connections.

3.4 CHANGE OF WORK

- A. In the event of revised scope or work formally issued through Change of Work order, contractor shall provide an itemized breakdown of pricing and receive approval prior to commencing work.

3.5 ARCHITECTURAL COORDINATION ITEMS

- A. Cutting and Patching:
 1. Cut and drill all openings in roofs, walls, and floors required for the installation. Neatly patch all openings cut. Hold cutting and patching to a minimum by arranging with other contractors for all sleeves and openings before construction is started. When drilling/cutting concrete slabs, utilize ground penetrating radar (GPR) and/or X-ray scanning equipment to verify the location is free from obstructions, including but not limited to: structural rebar/strands/tendons, electrical conduit/wiring, and/or piping/ductwork.
- B. Fire Caulking:
 1. Patching through fire rated walls and enclosures shall not diminish the rating of that wall or enclosure. Patch shall be equal to rockwool, firestop, caulk or approved "rated" patch.
 2. Provide products equivalent to the following:
 - a. For Floor Openings: 3M; Fire Barrier Sealant CP 25WB+
 - b. For Wall Openings: 3M; Fire Barrier Sealant CP 25WB+
 - c. Mineral Felt: Rockwool; Firepro Firestop Compound
 - d. For Insulated Pipes: 3M; Fire Sealant System CAJ5211
 - e. For Fill Areas: 3M; Fire Barrier Packing Material PM 4
 3. For larger openings where pipes penetrate fire rated enclosures that cannot be sealed with products described above, utilize approved UL products equal to 3M FireDam Spray 200.
- C. Access Panels:
 1. Provide all access panels required for proper servicing of equipment. Provide fire rated access panels at fire rated assembly penetrations rated at or above the fire rating of the

assembly. Provide frame as required for finish. Coordinate installation with General Contractor as they may elect to install access panel. Exact location(s) must be approved by the Architect. Minimum size to be 12" x 12", units to be 16-gauge steel, primed for paint, and locking device shall be screwdriver cam locks.

2. For equipment above gypsum board or "hard ceilings", provide equipment access panels sized to permit complete holistic removal of the unit in its entirety. Access panel shall also be sized to accommodate removal of the largest piece of equipment in the case where such access panel is used as a removal pathway for multiple pieces of equipment.

3.6 PROTECTION OF SURFACES

- A. Make every effort to protect roofs, walls and floors from dust, debris, water, sewage, foot traffic, equipment, carts, lifts, etc. prior to and during construction phase(s).
- B. Make roof penetrations and install roof flashing in accordance with roofing manufacturer's recommendations. Obtain written certification from roofing manufacturer that work has been performed properly and that roof warranty is intact.

3.7 UTILITY VERIFICATION REQUIREMENTS

- A. Field verify locations of underground and aboveground utilities, or those otherwise obscured from view, in the vicinity of work prior to commencing work. Utilize "811" call before you dig and hire locating service to identify, locate and mark remaining utilities and private lines.
- B. Camera scope and dye testing existing piping, ductwork and pathways to confirm existing conditions and use including, but not limited to, voltage, natural gas pressure, sanitary, storm, chilled water, steam, etc.)
- C. Obtain on-site approval from local utility prior to connecting to existing services.
- D. Failure to perform the above shall result in contractor proceeding at their risk and accepting full responsibility for incorrect connections.

3.8 DELIVERY, STORAGE, HANDLING, AND PROTECTION

- A. Receive, inspect, store and protect all materials required for new work. Do not accept or install any product damaged in any way.
- B. Comply with all manufacturer guidelines and requirements for movement, storage, and protection of new work. All new work must be stored in a clean, dry place protected from weather and construction traffic. Maintain acceptable temperature and humidity per manufacturer recommendations. When stored inside or during transport through building, do not exceed structural capacity of the floor.
- C. Coordinate and account for sizes of all new work included shipping materials with available openings. Account for rigging of all new work as required and as intended by manufacturer.
- D. Do not install work until work area is sufficiently weathertight, all wet work in area is complete and all work above is complete.

- E. Prior to installation, all products shall have the ability to be returned to the supplier or manufacturer after purchase and charged a reasonable restocking fee equal to a small portion of the cost.
- F. Protect all new work through construction from damage. Take safeguards necessary to protect from damage. Items damaged during construction will not be accepted and shall be replaced with new.
- G. Remove and replace all materials that have been installed improperly, physically damaged, moisture or water damaged, or mold damaged.
- H. Fully remove all packaging materials inside and out prior to startup.
- I. Retain all shipping protective covers and protective coatings during storage.
- J. Fixtures and equipment being shipped and/or stored shall be covered with plastic sheeting and enclosed in a cardboard or wood crate.
- K. Protect drains throughout all phases of construction to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- L. Place plugs in ends of uncompleted piping at end of each day or when work stops.

3.9 STARTUP, TESTING AND ADJUSTMENTS

- A. Adjust fixtures, equipment, accessories, and moving parts to function smoothly and lubricate as recommended by manufacturer.
- B. Provide necessary power to fixtures, equipment, and accessories to ensure proper functionality.
- C. Complete installation and startup checks according to manufacturer's written instructions.
- D. Perform the following adjustments before operation:
 1. Check piping connections for tightness.
 1. Close drain valves, hydrants, and hose bibbs.
 2. Open shutoff valves to fully open position.
 3. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
 4. Adjust and set all temperature, pressure, and flow set points for all fixtures, equipment, and/or accessories as required by authorities having jurisdiction or manufacturers recommendations, whichever carries the highest importance.
 5. Charge and test for leaks all plumbing systems, rectify all installation issues prior to putting any systems into service.
 6. Test each all backflow-prevention assemblies according to authorities having jurisdiction and the device's reference standard.

3.10 CLEANING EQUIPMENT AND PREMISES

- A. Vacuum, clean and wipe down all new work and equipment inside and out. Exposed parts which are to be painted shall be cleaned of all foreign objects and prepped for paint.

- B. During the progress of work, clean up and leave the premises and portions of the building in which work has occurred in a clean and safe condition. Provide this cleaning on a per-shift basis.

3.11 DEMONSTRATION / TRAINING

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

END OF SECTION 220501.00

SECTION 220503.00 - SUBMITTALS FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections and Division 22 Common Work Results for Plumbing Piping apply to this Section.

1.2 SUMMARY

- A. Section Includes: Administrative, content and format requirements for preparation and submission of submittals.
- B. Work of this Section is supplemental and additive to the requirements of Section 013300 where included in the Project Manual.
- C. "Request Drawings" form can be accessed, filled out and submitted at <http://www.klhengrs.com> (Bottom of page – Contractor Resources). Direct access to this form can be found here: <https://apps.klhengrs.com/drawingrequests>

1.3 PRICE AND PAYMENT PROCEDURES

- A. Payment in full or in part may be withheld from the Contractor for failure to comply with submittal requirements articulated in the Contract Documents.

1.4 SUBMITTALS

- A. Submittals shall be furnished for each Section that includes one or more of the following elements of work:
 1. Supply of one or more products.
 2. Installation of one or more products.
 3. Integration of one or more products.
 4. Creation of one or more deliverable products.
 5. Labeling of one or more products.
 6. Contractor-based design or engineering of one or more products or systems.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

- A. Submittals shall be routed through established Project channels as identified by the Owner's representative.

- B. Coordinate, assemble, title, transmit and track Project submittals.
- C. Label each submittal of each type similarly for consistency and so they appear as if prepared by the same entity. Like-type submittals (e.g., Product Data) from different Sections shall feature the same appearance and organization as those of other Sections.
- D. Submittals prepared by subcontractors or vendors shall not be accepted unless prepared in compliance with the Contract Documents and this specification.
- E. Submittal items listed in this Section represent the common items required to be supplied for the various specification Sections throughout the duration of the Project. Individual Sections will vary and may include additional or lesser requirements.
- F. Designer reserves the right to require additional submittals or to waive select submittal requirements on a Section-by-Section basis. Additional submittals shall be provided at the Contractor's expense.
- G. The cost for preparation and transportation of submittals is Work of the Contract.
- H. Bind physical/hardcopy submittals together. Do not submit loose or paper clipped documents.
- I. Supply separate submittals for each Specification Section. Do not combine multiple Sections together into a single submittal, except where expressly directed within the Contract Documents.
- J. Where electronic submittals are required or permitted, comply with the requirements for electronic submittals as identified in the Contract Documents.
- K. Organize submittals as identified in the Contract Documents.
- L. Furnish submittals for different Specification Sections each with its own transmittal form. A single transmittal shall not be used to identify submittals for more than one (1) Specification Section at a time. This allows for tracking and processing efficiency, so that:
 1. Each Section may be reviewed simultaneously by different individuals, as appropriate.
 2. Individual Sections may be processed and returned more quickly than others when some Sections require longer review times.
 3. Submittals that are returned and marked as "Revise and Resubmit" do not cause submittals for other Sections to be also be resubmitted due to the fact that they were bound together as a single unit.
- M. Availability of Electronic Drawings
 1. Refer to Common Requirements specification section within this discipline for specifics in regards to obtaining electronic editable versions of drawings for the creation of shop and as-built drawings.

3.2 SUBMITTAL TYPES

- A. The following are the common submittal types referenced in this Section:
 1. Quality Assurance (QA).
 2. Product Data (PD).
 3. Shop Drawing (SD).
 4. Training (TG).
 5. Field Observation Response (FO).
 6. Closeout Submittal (CO).

3.3 SUBMITTAL SEQUENCE

- A. Quality Assurance Submittal:
 - 1. When not expressly requested to be supplied with bid, the Quality Assurance submittal(s) shall be supplied upon request. When requested the submittal shall be delivered to the Designer within 16 business hours.
- B. Product Data Submittal:
 - 1. Submit following contract award or notice of intent to award a contract. Product data shall be submitted and reviewed prior to procurement of materials.
- C. Shop Drawing Submittal:
 - 1. Submit for review prior to commencement of fabrication and installation.
 - 2. Submit concurrently with Section-specific Product Data submittals.
- D. Training Submittal:
 - 1. Submit thirty (30) days prior to the first training session.
- E. Field Observation Report Submittal:
 - 1. Submit five (5) business days prior to punch list walkthrough.
- F. Closeout Submittal:
 - 1. Submit following completion of onsite work but not more than ten (10) business days following successful Acceptance Testing.

3.4 SUBMITTAL IDENTIFICATION

- A. Identify each submittal uniquely.
- B. Identify each submittal by specification Section number, submittal type, and submittal iteration.
- C. The format for labeling the submittals shall be as follows:
 - 1. Section Number–Submittal Type Abbreviation–Submittal Iteration.
 - 2. Examples:
 - a. First Product Data Submittal for section 224000: "224000-PD-00."
 - b. Revised Product Data Submittal for section 224000: "224000-PD-01."
 - c. Second Revised Product Data Submittal for 224000: "224000-PD-02."

3.5 SUBMITTAL CONTENTS

- A. All Submittals:
 - 1. Transmittal:
 - a. Supply a dedicated transmittal for submittals for each individual Section.
 - b. Itemize the specific submittals included by Section, submittal type, and iteration.
 - 2. Title Sheet:
 - a. Include a separate title sheet with each submittal, of each type.
 - b. Title sheets for each Section, for each submittal type, shall have the same appearance.
 - c. Title sheets for product data submittals shall be 8-1/2 inches x 11 inches.
 - d. Title sheets for drawings shall be the same size as the associated drawings.
 - e. Create title sheets to have the appearance and information identified on the sample title sheet published at the end of this Section.
 - 3. Index:

- a. Include an index outlining and identifying the contents of the submittal.
 - b. The index for drawing submittals shall be incorporated onto the title sheet of the corresponding drawing set.
- 4. Checklists:
 - a. Include the checklist(s) published in the Contract Documents corresponding to the type of submittal being supplied. Applicable checklists are found at the end of this Section and may also be found within individual Sections.
- 5. Title Blocks:
 - a. Drawing submittals shall be created on the Contractor's, manufacturer's, or vendor's own title block. The title blocks of the Owner, Architect, Engineer, Designer or their Consultants shall not be reproduced on any document (electronic or hardcopy) that is prepared or altered by the Contractor.
- 6. Legend:
 - a. Drawing submittals shall include a legend of symbology.
- 7. Resubmittals:
 - a. Resubmittals shall include a replica of the reviewer's comments that necessitated the resubmittal, along with an accompanying item-by-item explanation of the actions taken and changes that will be found within the resubmittal.

B. Quality Assurance Submittals:

- 1. List of Subcontractors to be used on the Project along with a description of the role each will play on the Project.
- 2. The last six (6) projects that the Contractor (and each proposed Subcontractor) has completed that are of similar scope, size and contract value. References shall include:
 - a. Owner's name and current contact information.
 - b. Project address.
 - c. Description of the system(s) and scope of actual work performed.
 - d. Monetary contract value of the Work performed.
- 3. Financial Disclosure of the Contractor: Prior to contract award, upon request.
- 4. Product Datasheets Submittals:
 - a. Separate manufacturer datasheets for each product.
 - b. Datasheets shall be manufacturer originals or first generation printed versions (i.e., from PDF) of the manufacturer's official electronic datasheet:
 - 1) Distributor modified, distributor branded, and/or html based "web" datasheets are not acceptable.
 - 2) Datasheets shall include size and technical support data.
 - c. Where manufacturer's datasheets depict multiple products, versions and options, indicate via highlighting, underlining, or with bold visible arrows the model(s), version(s) and option(s) being supplied. Exact catalog number(s) shall be indicated.
 - d. Each datasheet shall be labeled with the Section paragraph reference number. Datasheets shall include the Drawing reference when no specific paragraph reference exists within the Section.

C. Shop Drawing Submittals:

- 1. General:
 - a. Drawing descriptions identify the required contents of common drawings required under the Contract.
 - b. Drawings identified within individual Sections, along with any additional drawings deemed necessary by the Designer, are required.
 - c. Drawing Scales:
 - 1) Floor plans shall be drawn to scale.
 - 2) Section drawings shall be drawn to scale.
 - 3) Elevation drawings shall be drawn to scale.
 - 4) Details of physical items shall be drawn to scale.
 - d. Sizes:

- 1) Sheet sizes shall match the size of the Contract Drawings sheets, except where otherwise expressly requested or approved in advance by the Designer.

D. Training Submittals:

1. Proposed schedule.
2. Training agendas for each session.
3. Identification of personnel that will conduct training.
4. Handouts proposed for distribution during training.

E. Field Observation Report Submittals:

1. Written responses to Field Observation Reports supplied to the Contractor during the course of the Project:
 - a. The response shall include a copy of the original Field Observation Report.
 - b. The response shall include detail of the corrective action taken, the date the action was taken and the identity of the individual who took the action.

F. Closeout Submittals:

1. As-Built Drawings:
 - a. General:
 - 1) Requirements for Shop Drawings apply to "As-Built" drawings.
 - b. Required Drawings:
 - 1) Title Sheet.
 - 2) Floor Plans.
 - 3) As-built version of each Project shop drawing.
 - c. Drawing Formats:
 - 1) Electronic Editable: Editable version using the native application used to create the file (e.g., Revit, AutoCAD).
 - 2) Non-Editable: PDF file format.
 - 3) Printed Hardcopy.
 - 4) Sheets shall be the same size and feature consistent title block information in the lower-right corner.
 - d. Drawing Organization:
 - 1) Hardcopy drawings shall be bound together into logical sets, bound along the left edge of the sheets.
 - 2) The first page of the set shall include a detailed index and sheet-by-sheet description of each drawing sheet.
2. Operation and Maintenance Manuals:
 - a. Manual Format:
 - 1) Hard-cover 3-ring type binder.
 - 2) Front clear plastic cover pocket complete with Project and system Information insert.
 - 3) Clear plastic spine pocket with Project and system Information insert.
 - 4) Binder sized to suit the contents only, neither oversized nor undersized.
 - 5) Maximum binder thickness: 3 inches.
 - b. Manual Contents and Organization:
 - 1) General:
 - a) Separate binder (or binder set) for each system, labeled. Provide no more than one system per binder (or binder set).
 - b) Separate CD-ROM (or CD-ROM set) for each system, labeled. Provide no more than one system per CD-ROM (or CD-ROM set).
 - c) Do not overfill. Binders shall not be filled beyond an easily usable capacity.
 - d) Insert labeled tabs within binder to identify separate contents of the manual.

- e) Labeled sub-directories shall be created on the CD-ROM to label and separate contents for the manual.
- 2) Project Information Cover:
 - a) Title of Project.
 - b) Name and address of Owner, Designer, Architect, Contractor or Record and Subcontractor.
 - c) System name and specification references.
- 3) Index:
 - a) Contents of the manual.
- 4) Warranty Statement:
 - a) A warranty statement shall be included for each system. The warranty statement shall reiterate the terms of warranty identified within the Contract Documents, as well as identify how the Owner is to obtain warranty service.
 - b) The warranty statement shall clearly identify which products are covered by Manufacturer warranties beyond the Contractor required minimum warranty period. The term of manufacturer warranty shall also be identified (e.g., 2 year parts and labor).
 - c) A separate warranty statement shall be supplied for each system.
 - d) Identify the date that the warranty for the system starts. This date shall be the date listed on the Certificate of Substantial Completion (if one was issued to the contractor specifically for the system) or the date listed on the Notice of Final Completion.
 - e) Supply standard out-of-warranty service rates and service contact information.
- 5) Bill of Materials:
 - a) List of products supplied.
 - b) Serial numbers of each product.
- 6) Product Datasheets (supply only in the electronic version of Operation and Maintenance Manual):
 - a) Manufacturer datasheets for each product supplied.
- 7) Manufacturer Owner / User Manuals:
 - a) Manufacturer's Owner's or User's manual for each product.
 - b) Manufacturer's Installation instructions and other documentation supplied with the product.
- 8) Test Reports and Checklists:
 - a) Test reports, checklists, and other forms generated and completed during the course of the Project.
- 9) As-Built Drawings:
 - a) The hardcopy manual shall contain reduced scale printed version (11x17) of system-specific drawings.
 - b) The electronic manual shall contain electronic PDF version of the as-built drawings.

3.6 SUBMITTAL QUANTITY

A. General:

1. The quantity of submittals required shall be the greater of the following:
 - a. Quantity identified within Division 01.
 - b. Quantity identified within the individual Section.
 - c. Quantity identified herein.
2. In addition to the Contract required quantity, the Contractor shall also submit any additional quantities required for its own use and records, and for distribution to other trades.

3. The Designer shall retain a copy of each submittal received. Others in the submittal communication chain may also retain copies.
- B. Product Data Submittals:
 1. Two (2) Hardcopies.
 2. One (1) Electronic.
- C. Shop Drawings Submittals:
 1. Two (2) Hardcopies.
 2. One (1) Electronic.
- D. Field Observation Report Submittals:
 1. Two (2) Hardcopies.
 2. One (1) Electronic.
- E. Samples Submittals:
 1. Two (2) Hardcopies.
 2. One (1) Electronic.

3.7 SUBMITTAL REJECTION

- A. The following items are representative reasons that submittals may need to be revised and resubmitted:
 1. Binding submittals for multiple Sections together.
 2. Failing to supply separate transmittal for submittals for each Section.
 3. Failing to include a submittal title sheet.
 4. Failing to use and accurately complete the published title sheet.
 5. Failing to supply and accurately complete the submittal checklists.
 6. Failing to supply product data and shop drawings at the same time.
 7. Failing to supply product data sheets.
 8. Failing to supply product data sheets with the correct product and required accessories enumerated.
 9. Failing to supply shop drawings.
 10. Failing to supply shop drawings with required information.
 11. Failing to supply accurate information.
 12. Failing to supply relevant information required by the Specifications.
 13. Failing to supply products that are in compliance with the Specifications.
 14. Failing to supply the required information in the required format.

3.8 RESUBMITTALS

- A. Revise and Resubmit:
 1. When a submittal is rejected and flagged as "Revise and Resubmit," the entire submittal shall be reviewed, revised and resubmitted in totality.
 2. Resubmittals shall be checked for compliance with the Contract Documents, inclusive of requirements for submittals. In addition, any comments and deficiencies identified by the reviewer shall be appropriately acted upon.
- B. Exceptions Noted:
 1. When a submittal is flagged as "Exceptions Noted," the specific actions identified shall be taken.
 2. If the reviewer's comments include selective rejection of products, the resubmittal shall be limited to include those items commented upon.

C. Resubmittals shall:

1. Include a copy of the reviewer's previous comments.
2. Include a written description of the action(s) taken.
3. Be labeled chronologically.
4. Be inclusive of all corrective action identified by the previous reviewer.

3.9 ELECTRONIC SUBMITTALS

A. Electronic submittals shall only be permissible where electronic submittals are expressly required and where express approval for such has been granted.

B. Electronic submittal files shall be compatible for opening and viewing with electronic PDF file readers that fully support and recognize the Adobe PDF Portable Document Format Standard, version 1.5.

C. Major text within the files shall be electronically searchable using the search-for-text features of current generation Adobe PDF reader software. Files shall be prepared in such manner that reviewers will have the option to search for and find words and phrases that appear within the document, electronically. Documents featuring raster-based text and text that is otherwise not searchable shall not be acceptable. This precludes the use of documents that have been electronically scanned and then converted to or embedded within an electronic file.

D. The organization, contents, and labeling of information along with other requirements for submittals apply also to electronic versions of the submittals.

E. Single File Submission:

1. Option 1 – Single File, PDF Format:
 - a. Single PDF file submittals shall be assembled from a series of individual files that are organized, indexed, bound together as one composite file that is bookmarked to aid the reviewer in navigating the content.
 - b. The file shall feature a navigational tree of contents, organized by content groups (e.g., Title Page, Index, Datasheets, Shop Drawings). Content groups shall be organized in the same relative order identified within the Contract Documents.
 - c. Within each content group shall be the supporting elements of the group (e.g., product datasheets under the Datasheets group). Each element of the content group shall appear separately as a subordinate element of the group (e.g., separate entry for each product datasheet, separate entry for each shop drawing), and viewable from the navigational contents tree.
 - d. Under the Datasheets content group, individual product datasheet entries shall be identified by Make/Brand and Model. Entries shall be organized in a sorted manner, first by make, then by model.
 - e. If the resulting size of the composite PDF file exceeds 10 Megabytes, supply the submittal using the Single Zip File method instead, as described in this Section.
 - f. The file name used to label the submittal shall be the section number followed by the submittal instance number for that Section (e.g., 224000-PD-01.pdf).
 - 1) Where the Designer directs the supply of multiple zip files for a submittal, add additional text to the file name to identify that the file is part of a multi-file set of submittals, as per the following examples:
 - a) 224000-PD-01 (1 of 3).pdf
 - b) 224000-PD-01 (2 of 3).pdf
 - c) 224000-PD-01 (3 of 3).pdf
2. Option 2 – Single File, Zip Format:
 - a. Single Zip File submittals shall be assembled from a series of individual PDF files and file directories that are contained within a single compressed WinZip compatible ".zip" file.

- b. The file shall contain separate top-level directories that are used to group related content (e.g., 00-Title Page, 01-Index, 03-Datasheets, 04-Shop Drawings), with each directory appearing in the same relative order as that identified in the Contract Documents.
- c. Within each content group directory shall be separate PDF-compliant files featuring the information required (e.g., separate datasheet file for each product, separate file for each drawing).
- d. Product datasheet files shall be named using a consistent naming convention that enables those files to appear sorted and grouped when the file is opened for navigation, viewing or extraction by the reviewer.
- e. Product datasheet files shall be consistently named with the make/brand of the product, followed by model number, followed by any additional information beneficial.
- f. Consult the Designer for supplement instructions should the WinZip file exceed 50 Megabytes in size.
- g. The file name used for the submittal shall be the Section number followed by the submittal instance number for that Section (e.g., 224000-PD-01.zip).
 - 1) Where the Designer directs the supply of multiple zip files for a submittal, add text to the file name that identifies the file is part of a multi-file set as per the following examples:
 - a) 224000-PD-01 (1 of 3).zip
 - b) 224000-PD-01 (2 of 3).zip
 - c) 224000-PD-01 (3 of 3).zip

END OF SECTION 220503.00

SUBMITTAL TITLE SHEET
EXAMPLE
(Form: Sub-1)

BID DOCUMENTS
DECEMBER 2025

PROJECT TITLE:
Project Name Line 1
Project Name Line 2
Project Name Line 2

SUBMITTAL TYPE:
Product Data

SECTION SUBMITTAL NUMBER

224000.00-PD-00

SECTION TITLE:
Plumbing Fixtures

Date Prepared:
yyyy-mm-dd

CONTRACTOR OF RECORD:
Firm Name
Address 1
Address 2
City, State, Zip
Phone (000) 000-0000, Fax (000) 000-0000
Project Manager: Full Name
PM E-Mail: xxxxxxxx@xxxx.xxx

SECTION SUBCONTRACTOR(S):

Firm Name Address 1 Address 2 City, State Zip Phone (000) 000-0000 Fax (000) 000-0000 PM Name: Full Name PM E-Mail: xxxxxxxx@xxxx.xx	Firm Name Address 1 Address 2 City, State Zip Phone (000) 000-0000 Fax (000) 000-0000 PM Name: Full Name PM E-Mail: xxxxxxxx@xxxx.xx
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PRODUCT DATA SUBMITTAL
CHECKLIST
(Form: Sub-2)

BID DOCUMENTS
DECEMBER 2025

Each line below featuring text shall be supplied with an answer.

	No	Yes
Transmittal		
Title Sheet		
Project Name		
Specification Section number		
Submittal iteration number (0 for first iteration, 1 + for each subsequent iteration (e.g., 224000-0, 224000-1))		
Contractor of Record identified		
Sub-contractor / vendor / supplier name identified		
Title Sheet appearance consistent with sample title sheet		
Checklists included		
This checklist		
Checklists from Section being submitted (where applicable)		
Previous submittal review, with contractor actions and comments		
Product Datasheets included		
Datasheets are manufacturer originals		
Datasheets for each product included		
Section paragraph and/or Drawing reference on each datasheet		
Product accessories and options identified		
Products organized by paragraph (or alphabetically by brand)		
No photocopies, faxes and other illegible datasheets included		
Shop Drawings included		
Shop drawings accompany this product data submittal.		
This submittal contains product data for one Section only.		

This checklist serves as a simple and abbreviated reminder of the contents and format of the aforementioned submittal. Refer to Section 220503 "Submittals for Plumbing" and each specific Section for additional submittal requirements. Submittals are subject to rejection if this checklist is not accurately completed and provided along with the specified information. Reproduce this checklist and submit with each submittal for each Section.

SECTION 220505.00 - EXISTING CONDITIONS AND DEMOLITION

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 DESCRIPTION OF WORK

- A. Prior to submitting a bid, the Plumbing Contractor shall perform a detailed walk-through field inspection, to review the existing structures and premises, to determine all existing conditions, equipment/ piping locations, etc. and shall make all necessary allowances for all required Plumbing related demolition and relocation work. This pre-bid inspection by the Plumbing Contractor shall include inspection of all applicable accessible ceiling cavity, areas, etc.
- B. Should the Plumbing Contractor take any exceptions to providing any related demolition or relocation work, such exceptions shall be stated in detail within the Prime Contractor's bid. No subsequent allowance to the contract cost shall be made for any insufficient allowances made by the Plumbing Contractor during bidding which may result from the Plumbing Contractor's failure to visit job site and review drawings.
- C. Demolition related work may not be specifically indicated on drawings but shall be included under base bid. All Plumbing related demolition, relocation, etc. work, including work described herein, shall be under base bid.
- D. It is not the intent of these contract documents that existing conditions be accurately shown. Existing Plumbing work is shown to a limited extent on drawings and is shown for general planning reference only. Such locations, etc. have been located from portions of contract documents which were prepared for previously installed work (not from "as-builts"). These locations are not guaranteed. The successful Plumbing Contractor shall have access to all available existing building/system plans and specifications.
- E. The existing plumbing systems may be utilized only to the extent indicated herein or on drawings and/or as directed by Owner's representative in field.
- F. Routing of all new plumbing systems in existing buildings shall be approved by Owner's representative prior to installation.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 EFFECT ON ADJACENT OCCUPIED AREAS

- A. Locate, identify, and protect existing Plumbing services passing through demolition areas and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.
- B. It is recognized that there may be some systems rendered inactive by demolition, causing disconnection of "downstream" branches, equipment, etc. which serve occupied areas. It shall be the responsibility of the Plumbing Contractor to investigate these types of conditions (for all systems) prior to demolition. Provide all necessary corrective Plumbing work prior to demolition to ensure that such "downstream" work remain permanently active throughout demolition, new construction and after project completion.
- C. All work and system shutdowns shall be carefully coordinated in advance with owner's representative and all affected trades so that normal building activities and other construction trades are minimally affected. All required Plumbing related demolition and/or new construction work, which will affect any and all occupied areas (including those which are located outside the immediate area of project work) shall be performed at special times if/as directed by Owner's representative in field.
- D. All existing systems and components shall remain fully operational in all occupied spaces during all occupied periods.
- E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent finished areas and/or other system components. During cutting and patching operations, protect adjacent installations. Remove protection and barriers after demolition operations are complete.

3.2 WORK IN EXISTING SPACES

- A. General: Care shall be taken when working in existing spaces so as not to damage existing walls and ceilings where work is being performed.
- B. Existing Ceilings: Where work is being performed above ceilings, and the architectural drawings do not indicate ceiling modifications by the General Contractor, it shall be the responsibility of this contractor to remove and replace existing ceilings where work is being performed. In those instances, all repair and installation of new grid, ceiling panels, etc shall be the responsibility of this contractor. Match existing finishes.
- C. Walls & Floors: It shall be the responsibility of this contractor to patch existing walls and floors and match existing finishes where work is being removed or installed and patching is being performed, unless noted otherwise on the architectural drawings.
- D. If asbestos, PCB's, or other hazardous materials are encountered in the course of the work, stop work in the vicinity of such materials and report their presence to the Owner. Owner will arrange for proper removal and disposal of hazardous materials.

3.3 GENERAL DEMOLITION

- A. Provide complete Plumbing demolition as required for all systems throughout all project areas not indicated to be salvaged or saved. Unless specifically noted otherwise on plans or determined otherwise during this contractor's pre-demolition survey, all abandoned existing Plumbing work in the project areas shall be disconnected and removed in its entirety by the Plumbing Contractor. All related work shall comply with the notes specified herein.

- B. Provide demolition work as required to clear and remove all existing Plumbing work to be abandoned and as required to accommodate all new work of all trades. In general, remove existing related piping, control media, etc. back to nearest concealed accessible terminal or take-off "upstream". Extend piping, etc. as required to accommodate new or relocated Plumbing work.
- C. Demolish all accessible previously abandoned, inactive and obsolete equipment, piping, etc. All inaccessible materials embedded in floors, walls, and ceilings may remain if such materials do not interfere with new installations. Coordinate all demolition work carefully with Owner prior to the start of construction.
- D. All demolished piping shall be capped back to active source(s) per contract drawings, even if source(s) are outside of the confines of the project area. Coordinate all demolition work carefully with Owner prior to the start of construction.
- E. Perform cutting and patching required for demolition in accordance with the contract documents.
- F. All piping, etc. conflicting with construction related work of any and all trades shall be removed and/or relocated by the Plumbing Contractor as necessary and/or as directed by Owner's representative in the field. Plumbing disconnections (and/or reconnections) for equipment to be removed (and/or relocated) shall be by the Plumbing Contractor. This shall apply to all existing Plumbing work whether shown on drawings or not.
- G. Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment not indicated to be salvaged.
- H. Provide new work as required to accommodate relocations, etc. Routing of all new and piping in existing buildings shall be held tight to structure above wherever possible and shall be approved by owner's representative prior to installation.

3.4 DISPOSITION OF REMOVED EQUIPMENT & MATERIALS

- A. Except where specifically noted otherwise herein or on drawings, all Plumbing work shown on new work plans shall be new.
- B. If required to accommodate construction related activities, remove and reinstall any conflicting fixtures, devices or equipment that are to remain.
- C. All abandoned materials removed during demolition and thereafter shall be referred to the Owner's representative for disposal instructions. All materials which the Owner elects to retain shall be neatly stored at the site by the Plumbing Contractor as designated by the Owner's representative. All materials which the Owner elects not to retain shall be disposed of by the Plumbing Contractor in a lawful manner.
- D. All fixtures, devices or equipment designated for salvage (removal and reuse, or for turning over to Owner) shall be disconnected and removed undamaged. Disconnect all pigtails, etc. from equipment terminal points and carefully transport and neatly store same to a protected on-site storage location as directed in field.
- E. Components to be reused shall be cleaned (inside and out) and reinstalled where indicated on drawings. Modify and/or extend related existing ductwork and/or piping as required.
- F. Components turned over to Owner shall be neatly stored as groups by system type.

3.5 PRE-EXISTING CODE VIOLATIONS

- A. All existing work which is accessed and/or used under this project shall be inspected and brought into compliance with current codes and standards by the Plumbing Contractor. This shall apply only to the extent that such work is uncovered in the immediate project areas affected by demolition and/or new construction and only to the limited extent that it applies to pre-existing general installation methods (i.e. a missing hanger/support, a missing seal and other minor incidental work).
- B. If more extensive code or safety violations are discovered by the Plumbing Contractor, they shall be immediately brought to the attention (detailed in writing) of the Owner's representative along with the contractors proposed cost for corrections.

3.6 INTERIM LIFE SAFETY WORK

- A. Provide interim fire protection (sprinkler) work in all demolition and construction areas for full code coverage. Further definition will be provided in field if required.

END OF SECTION 220505.00

SECTION 220517.00 - SLEEVES AND SLEEVES SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

A. Product Data:
1. Provide product datasheets for all products specified under this section.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.2 STACK-SLEEVE FITTINGS

A. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.
1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. Metraflex Company (The).
4. Pipeline Seal and Insulator, Inc.
5. Proco Products, Inc.
6. Link-Seal Modular Seals

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel.
3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

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. Presealed Systems.
2. Advance Products & Systems, Inc.
3. CALPICO, Inc.

4. Metraflex Company (The).
5. Pipeline Seal and Insulator, Inc.
6. Proco Products, Inc.
7. Link-Seal Modular Seals

B. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
 1. Sleeves are not required for core-drilled holes.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
 2. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Install rockwool and/or caulk between pipe and sleeve. Material must meet all applicable fire ratings.
- E. Install sleeves for pipes passing through interior partitions.
 1. Cut sleeves to length for mounting flush with both surfaces.
 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."

F. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

- A. Install stack-sleeve fittings in new slabs as slabs are constructed.
- B. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
- C. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."
- D. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
- E. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
- F. Using grout, seal the space around outside of stack-sleeve fittings.
- G. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:
 - a. Galvanized-steel-pipe sleeves.
2. Exterior Concrete Walls below Grade:
 - a. Cast-iron wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
3. Concrete Slabs-on-Grade:
 - a. Cast-iron wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
4. Concrete Slabs above Grade:
 - a. Stack-sleeve fittings
 - b. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
5. Interior Partitions:
 - a. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

END OF SECTION 220517.00

SECTION 220523.00 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, material descriptions, and finishes.
 - 2. Clearly state model numbers on all submittals.

1.2 GENERAL REQUIREMENTS FOR VALVES

- A. Source Limitations for Valves: Provide project valves from a single source and manufacturer.
- B. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
 - 1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

PART 2 - PRODUCTS

2.1 BRONZE BALL VALVES

- A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Jomar Valve.
 - b. Legend Valve.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Red White Valve Corp.
 - 2. Description:
 - a. Standard: MSS SP-110.
 - b. Pressure Rating: 150 psi @ 250°F.
 - c. Body Design: Two piece.
 - d. Body Material: Bronze, lead-free dezincification-resistant.
 - e. Seats: PTFE or TFE.
 - f. Stem: Bronze, blowout-proof.
 - g. Ball: Chrome-plated brass.
 - h. Port: Full.
 - i. Adjustable packing gland.
 - j. Vinyl-covered steel handle.

2.2 BRONZE SPRING CHECK VALVES

- A. Y-pattern, Bronze Spring Check Valves with Bronze Disc rated 150 psi non-shock CWP:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. American Valve, Inc.
- b. <http://www.specagent.com/LookUp/?uid=123456821412&mf=04&src=wdCraneCo>
- c. Hammond Valve.
- d. Milwaukee Valve Company.
- e. NIBCO INC.
- f. Red-White Valve Corporation.
- g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

- a. Standard: MSS SP-80, Type 3.
- b. CWP Rating: 150 psig.
- c. Body Material: ASTM B 62, bronze.
- d. Ends: Threaded or solder-type.
- e. Disc: Bronze.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Set ball and plug valves open to minimize exposure of functional surfaces.
- C. Orient check valves in correct direction of flow.
 1. Mount swing checks in a horizontal position so the check will swing into closed position in a no-flow situation.
 2. Spring checks can be mounted in the horizontal and vertical position.
- D. Locate valves for easy access and provide separate support where necessary.
- E. When feasible, install ball valves in horizontal piping with stem at or above center of pipe.
- F. Install valves in position to allow full stem and handle movement.

- G. Install water-control valves with inlet and outlet shutoff valves and bypass with globe valve. Install pressure gages on inlet and outlet.
- H. Install check valves for proper direction of flow and as follows:
 - 1. Spring Check Valves: In horizontal or vertical position.

3.3 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 DOMESTIC WATER VALVE SCHEDULE

- A. Where specific valve types are not indicated, the following requirements apply:
- B. Isolation/Control Valves
 - 1. All valves installed in domestic water piping 3" and smaller shall be ball valves.
 - a. Ball Valves - 2 Inch and Smaller: 2-piece body. Provide extended valve stems for valves used on insulated lines. Provide equal to Nibco Series 585-80-LF.
- C. Check Valves
 - 1. Provide solder end check valves on each domestic hot and cold water service piping. Provide check valves equal to Nibcon T-480-Y-LF.
 - 2. Provide a spring (silent) check valve immediately downstream of the main water service reduced pressure backflow preventer when a booster pump is installed on the domestic water system.
 - 3. Provide check valve on each domestic hot and cold water supply to thermostatic mixing valves, mop sinks and three compartment sinks. Provide check valves equal to Nibcon T-480-Y-LF. ASSE 1070 point of use mixing valves with integral check valves shall not be required to have upstream in-line check valves.
 - 4. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION 220523.00

SECTION 220529.00 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

- A. Product Data: For each type of product.
 - 1. Include construction details, rated capacities, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Clearly state model numbers on all submittals.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

PART 2 - PRODUCTS**2.1 METAL PIPE HANGERS AND SUPPORTS**

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
 - 3. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 4. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon or stainless steel.
- B. Copper Pipe Hangers:
 - 1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
 - 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.
 - 3. For vertical piping NPS 2 and smaller: Van (Bell) hangers; Carbon steel, copper plated with epoxy coating and stainless steel screw. Size to match pipe size.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Anvil International, Inc.
 - 2. Elcen Metal Products Co.
 - 3. PHD Manufacturing, Inc
 - 4. National Pipe Hanger Corp.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

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

1. ERICO International Corporation.
2. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
3. Rilco Manufacturing Co., Inc.

B. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 552, Type II cellular glass with vapor barrier.

C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hilti, Inc.
 - b. ITW Ramset/Red Head
 - c. MKT Fastening, LLC
 - d. Powers Fasteners.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated or stainless-steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hilti, Inc
 - b. ITW Ramset/Red Head
 - c. MKT Fastening, LLC
 - d. Powers Fasteners

2.5 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

2.6 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible. Where piping of various sizes is supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe as specified above for individual pipe hangers.
- B. Do not suspend hangers from roof decks. Suspend from roof trusses, joists and joist girders only at panel points and at top chords unless otherwise indicated.
- C. All piping hangers in exterior spaces, such as parking garages, exposure to high humidity, etc., or in interior swimming pool areas shall be galvanized.
- D. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- E. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- F. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- G. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers and attachments for general service applications.
- H. Use padded hangers for piping that is subject to scratching.
- I. Where piping is close to floor or roof, support on adjustable pipe support.
- J. All plumbing equipment shall have concrete bases and/or structural steel supports and shall be provided by this contractor.
- K. The use of pumps or other equipment as piping supports shall be prohibited. All such connectors and their supports shall be independently supported from the building structure and inspected and approved by the Engineer before bolting.

- L. Piping connections to all equipment with moving parts shall be isolated with braided copper or stainless steel flexible links, which shall be selected to absorb the deflection on the isolating members.
- M. Use thermal-hanger shield inserts for insulated piping and tubing.
- N. Hanger and support types:
 1. Hangers: Provide adjustable, Steel Clevis Hangers (MSS Type 1) for suspension of noninsulated or insulated, stationary pipes.
 2. Horizontal-Piping Clamps: Provide Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3) for suspension of pipes requiring clamp flexibility and up to 4 inches of insulation.
 3. Vertical-Piping Clamps: Provide extension pipe or Riser Clamps (MSS Type 8) for support of pipe risers.
- O. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
- P. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Inserts:
 - a. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from structural concrete ceiling.
 2. Clamps:
 - a. C-Clamps (MSS Type 23): For structural shapes.
 - b. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 3. Miscellaneous:
 - a. Welded Beam Attachments (MSS Type 22): For attaching to bottom of steel beams if loads are considerable and rod sizes are large.
 - b. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - 1) Light (MSS Type 31): 750 lb.
 - 2) Medium (MSS Type 32): 1500 lb.
 - 3) Heavy (MSS Type 33): 3000 lb.
 - c. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 - d. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- Q. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 2. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- R. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- S. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.
- T. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

- U. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- V. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- W. Fastener System Installation:
 - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 - 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- X. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- Y. Install lateral bracing with pipe hangers and supports to prevent swaying.
- Z. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, guides, expansion joints, strainers and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- AA. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- BB. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- CC. Insulated Piping:
 - 1. Attach clamps and spacers to piping.
 - a. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation. Do not exceed pipe stresses allowed by manufacturer.
 - b. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - c. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - d. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 3. Shields:
 - a. Install protective galvanized steel shields, MSS Type 40, on insulated piping smaller than 2-inch NPS. Shields shall span an arc of 180 degrees and shall be a minimum of 12-inches in length.
 - b. Install thermal-hanger shield inserts on all insulated piping 2-inch NPS and larger.
 - 4. Shield Dimensions for Pipe: Not less than the following:

- a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
- 5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
- 6. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
- 7. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
- 8. Vertical Piping: MSS Type 8 or Type 42, clamps.
- 9. Install individual, straight, horizontal piping runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
- 10. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
- 11. Base of Vertical Piping: MSS Type 52, spring hangers.

DD. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

EE. Support vertical piping and tubing at base and at each floor.

FF. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

GG. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

- 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
- 2. NPS 3: 60 inches with 1/2-inch rod.
- 3. NPS 4: 60 inches with 5/8-inch rod.
- 4. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

HH. Install supports for vertical cast-iron soil piping every 15 feet.

II. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

- 1. NPS 1-1/4: 72 inches with 3/8-inch rod.
- 2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
- 3. NPS 2-1/2: 108 inches with 1/2-inch rod.
- 4. NPS 3 and NPS 4: 10 feet with 1/2-inch rod.

JJ. Install supports for vertical copper tubing every 10 feet.

KK. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and 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. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099113 "Exterior Painting", Section 099123 "Interior Painting" or Section 099600 "High-Performance Coatings."
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Piping:

Piping Material	Pipe Size	Hanger Spacing (OC)	Vertical Support (OC)
Cast Iron	Any	5'-0"	15'-0"
Ductile Iron	Any	5'-0"	15'-0"
Copper	1-1/4" and smaller	6'-0"	10'-0"
Copper	1-1/2" and larger	10'-0"	10'-0"
PVC	Any	4'-0"	10'-0"
CPVC	1" and smaller	3'-0"	10'-0"
CPVC	1-1/4" and larger	4'-0"	10'-0"
Polyethylene Piping (PE)	Any	2'-6"	10'-0"
Steel	Any	12'-0"	15'-0"

1. In addition to supported pipe information above, support piping at each change in direction.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

END OF SECTION 220529.00

SECTION 220553.00 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

- A. Product Data: For each type of product.
 - 1. Provide product datasheets for all labels, signs, valve tags, and warning tags.
- B. Closeout Submittals (CO):
 - 1. Valve numbering scheme.

PART 2 - PRODUCTS**2.1 EQUIPMENT LABELS**

- A. Plastic Labels for Equipment:
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, with predrilled holes for attachment hardware.
 - 2. Letter Color: Black.
 - 3. Background Color: White.
 - 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
 - 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 - 6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.
- C. Equipment-Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe-Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; pipe size; and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size:
 - a. $\frac{3}{4}$ " – 2-1/2" diameter piping, $\frac{3}{4}$ " minimum letter height.
 - b. 3" – 8" diameter piping, 1-3/4" minimum letter height.
 - c. 10" diameter piping, 2-1/2" minimum letter height.
 - d. Greater than 10" diameter piping, minimum 3-1/2" letter height.

E. Pipe Label Color Schedule:

1. Domestic Cold Water, Hot Water, Hot Water Return, Drain, Waste, and Vent:
 - a. Background Color: Green.
 - b. Letter Color: White.

2.3 VALVE TAGS

A. Valve Tags: Stamped or engraved 1-1/2 inch diameter brass with 1/4-inch stamped letters for piping-system abbreviation and 1/4-inch alphanumeric lettering.

1. Tag Material: Brass, 0.032 inch thick, with predrilled holes for attachment hardware.
2. Fasteners: Brass beaded chain.
3. Associated piping system.
4. Location of valve (architectural room name and/or number).
5. Normal-operating position (open, closed, or modulating).
6. Identify special or unique characteristics (emergency shutoff).

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Locate equipment labels where accessible and visible. Install or permanently fasten labels on each major item of mechanical equipment. Install identifying devices with completion of covering and painting of surfaces where devices are to be applied, locations of access panels and doors, and acoustical ceilings or similar concealment.

3.3 PIPE LABEL INSTALLATION

A. 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.

3.4 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

END OF SECTION 220553.00

SECTION 220719.00 - PLUMBING SYSTEMS INSULATION**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

A. Product Data:

1. Provide product datasheets for all insulation materials, adhesives, and sealants. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).
2. Product Data: For adhesives and sealants, documentation including printed statement of VOC content and chemical components.
3. Laboratory Test Reports: For adhesives and sealants, documentation indicating that product complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.2 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing 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 agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

PART 2 - PRODUCTS**2.1 INSULATION MATERIALS**

A. Insulation products that encounter stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

B. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

C. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Aeroflex USA, Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS. ASTM C 534, Type I

D. Fiberglass Insulation:

1. Fiberglass piping insulation: ASTM C 547, Type 1 and 4
2. Encase pipe fittings insulation with one-piece pre-molded PVC fitting covers.

3. Vapor Barrier Material: Paper-backed aluminum foil, except as otherwise indicated, strength and permeability rating equivalent to adjoining pipe insulation jacketing.
4. Staples, Bands, Wires, and Cement: As recommended by insulation manufacturer for applications indicated.
5. Adhesives, Sealers, and Protective Finishes: As recommended by insulation manufacturer for applications indicated.
6. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - a. Armstrong World Industries, Inc.
 - b. Owens-Corning Fiberglass Corp.
 - c. Keene Corp.
 - d. CertainTeed.
 - e. Johns Manville.

2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.
 1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 SEALANTS

- A. Joint Sealants:
 1. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
 - b. Eagle Bridges - Marathon Industries; 405.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - e. Pittsburgh Corning Corporation; Pittseal 444.
 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 3. Permanently flexible, elastomeric sealant.
 4. Service Temperature Range: Minus 100 to plus 300 deg F.
 5. Color: White or gray.
 6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.5 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 1. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - a. ABI, Ideal Tape Division; 428 AWF ASJ.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
 - c. Compac Corporation; 104 and 105.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
 2. Width: 3 inches.
 3. Thickness: 11.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
 1. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - a. ABI, Ideal Tape Division; 491 AWF FSK.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
 - c. Compac Corporation; 110 and 111.
 - d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.
 2. Width: 3 inches.
 3. Thickness: 6.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
 1. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - a. ABI, Ideal Tape Division; 370 White PVC tape.
 - b. Compac Corporation; 130.
 - c. Venture Tape; 1506 CW NS.
 2. Width: 2 inches.
 3. Thickness: 6 mils.
 4. Adhesion: 64 ounces force/inch in width.
 5. Elongation: 500 percent.
 6. Tensile Strength: 18 lbf/inch in width.
- D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
 1. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

- a. ABI, Ideal Tape Division; 488 AWF.
- b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
- c. Compac Corporation; 120.
- d. Venture Tape; 3520 CW.
- 2. Width: 2 inches.
- 3. Thickness: 3.7 mils.
- 4. Adhesion: 100 ounces force/inch in width.
- 5. Elongation: 5 percent.
- 6. Tensile Strength: 34 lbf/inch in width.

2.6 REMOVEABLE INSULATION

- A. Removeable valve insulation materials shall be asbestos and lead free, compatible with insulation materials, and substrates; comply with MIL-PRF-19565C, Type II.
- B. Suitable for indoor or outdoor use on below-ambient services.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ProTherm
 - b. UniTherm
 - c. Thermaxx
 - 2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
 - 3. Service Temperature Range: 0 to 600 deg F.
 - 4. Securement means: hook-and-loop or zipped. Hot-rings, staples and wire are not acceptable methods of securement or closure.
 - 5. Insulation:
 - a. Material: Mineral wool and fiberglass.
 - b. Thickness: 2"
 - c. Thermal resistance: R0.48.
 - 6. Jacket material: Waterproof silicone coated fiberglass cloth.
 - 7. Color: Gray

2.7 SECUREMENTS

- A. Bands:
 - 1. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M; 0.015 inch thick, 1/2 inch wide.
 - 2. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide.
- B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.
- C. Wire: 0.080-inchnickel-copper alloy.

2.8 PROTECTIVE SHIELDING GUARDS

- A. Protective Shielding Pipe Covers:
 - 1. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - a. Engineered Brass Company.
 - b. Insul-Tect Products Co.; a subsidiary of MVG Molded Products.
 - c. McGuire Manufacturing.
 - d. Plumberex.
 - e. Truebro.

- f. Zurn Industries, LLC.
2. Description: Manufactured plastic wraps for covering plumbing fixture water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures:

1. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - a. Truebro; a brand of IPS Corporation.
 - b. Zurn Industries, LLC.
 - c. ProFlo
 - d. Plumberex.
2. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 1. Verify that systems to be insulated have been tested and are free of defects.
 2. Verify that surfaces to be insulated are clean and dry.
- B. 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. 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. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- B. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- C. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- D. 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.
- E. Install insulation with longitudinal seams at top and bottom of horizontal runs.

- F. Install multiple layers of insulation with longitudinal and end seams staggered.
- G. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- H. Keep insulation materials dry during application and finishing.
- I. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- J. Install insulation with least number of joints practical.
- K. 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.
- L. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- M. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- N. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- O. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- P. 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.
- Q. For above-ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.
 - 4. Cleanouts.

3.4 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 Section 078413 "Penetration Firestopping" for 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 Section 078413 "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. 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.
 2. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 3. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 4. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 5. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 6. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
 7. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 8. 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.

9. 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.
10. 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. 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. Provide 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.

E. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Underground piping.
2. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe 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.

C. 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 QUALITY CONTROL

- A. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.8 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 1. Drainage piping located in crawl spaces, unless piping is subject to freezing.
 2. Underground piping conveying unheated fluids.
 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.9 INDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

- A. Domestic Cold Water:
 1. Insulation shall be one of the following:
 - a. Flexible Elastomeric: 1/2 inch thick.
 - b. Insulation thicknesses shall be doubled for piping installed in non-conditioned spaces such as boiler rooms, attics, crawl spaces, tunnels, etc.
- B. Domestic Hot and Recirculated Hot Water:
 1. Insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch thick.
 - b. Insulation thicknesses shall be doubled for piping installed in non-conditioned spaces such as boiler rooms, attics, crawl spaces, tunnels, etc.
- C. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:
 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. One-piece PVC, with 1/8" thickness, meeting the standards of ASTM E 84-07 with a flame spread/ 450 smoke index per the building code. Surfaces to be soft, smooth, non-absorbent, easy to clean U/V inhibited, antimicrobial, antifungal properties. Insulator shall have a dual fastening system which consists of fusion bonded Velcro fastener strips for full slit enclosure and tamper resistant, smooth, non-abrasive snap-locking fasteners. P-Trap Insulator: Shall have a one-piece design with a universal fit for 1 1/4"-1 1/2" brass or plastic traps, a longer neck area (for longer tailpieces) and a more forgiving girth area (for bulkier plastic DWV Schedule #40 plastic P-Traps w/swivel nut) and shall have drainage at lowest point to prevent condensation and/or leakage build up. Valve and Supply Insulator: Shall have a one-piece design with a universal fit over valve handles and brass, plastic or metal braided supplies and connectors and shall be able to flexcurl to a minimum of 360 degrees with a full slit closure for total compliance. Off-Set Insulator: Shall have a one-piece design with a universal fit and shall fit inside of P-trap insulator tailpiece area.

- b. Soft, resilient molded vinyl, with 1/8" minimum constant nominal wall thickness with internal ribs, UV resistant, which meets the requirements of ASTM D-635 burning characteristics.

END OF SECTION 220719.00

SECTION 221116.00 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

- A. Product Data (PD):
 - 1. Provide product datasheets for all products specified under this section.
 - 2. Product Data: For solvent cements and adhesive primers, documentation including printed statement of VOC content.
 - 3. Laboratory Test Reports: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Potable-water piping and components shall comply with NSF 14 and NSF 61.

2.2 COPPER TUBE AND FITTINGS (PIPE SIZE 4" AND SMALLER)

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
- B. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
- C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
- E. Copper Unions:
 - 1. MSS SP-123.
 - 2. Cast-copper-alloy, hexagonal-stock body.
 - 3. Ball-and-socket, metal-to-metal seating surfaces.
 - 4. Solder-joint or threaded ends.
- F. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, and are limited to, the following:
 - a. Mueller Streamline Co.
 - b. Great Lakes Copper, LTD.
 - c. Cerro Flow Products, LLC.
- G. Copper Pressure-Seal-Joint Fittings:
 - 1. Fittings for NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber, O-ring seal in each end.
 - 2. Fittings for NPS 2-1/2 to NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

H. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, and are limited to, the following:

- a. Elkhart Products Corporation.
- b. NIBCO Inc.
- c. Viega.

2.3 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials:
 1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
 2. Full-face or ring type unless otherwise indicated.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys.
- D. Flux: ASTM B 813, water flushable.

2.4 TRANSITION FITTINGS

- A. General Requirements:
 1. Same size as pipes to be joined.
 2. Pressure rating at least equal to pipes to be joined.
 3. End connections compatible with pipes to be joined.
- B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
- C. Sleeve-Type Transition Coupling: AWWA C219.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cascade Waterworks Manufacturing.
 - b. Dresser, Inc.; Piping Specialties Products.
 - c. Ford Meter Box Company, Inc. (The).
 - d. JCM Industries.
 - e. Romac Industries, Inc.
 - f. Smith-Blair, Inc.; a Sensus company.
 - g. Viking Johnson.

2.5 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- B. Dielectric Unions:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Capitol Manufacturing Company; member of the Phoenix Forge Group.
 - b. Central Plastics Company.
 - c. Hart Industries International, Inc.
 - d. Jomar International.

- e. Matco-Norca.
- f. McDonald, A. Y. Mfg. Co.
- g. Watts; a division of Watts Water Technologies, Inc.
- h. Wilkins; a Zurn company.

2. Standard: ASSE 1079.
3. Pressure Rating: 125 psig minimum at 180 deg F
4. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Capitol Manufacturing Company; member of the Phoenix Forge Group.
 - b. Central Plastics Company.
 - c. Matco-Norca.
 - d. Watts; a division of Watts Water Technologies, Inc.
 - e. Wilkins; a Zurn company.
2. Standard: ASSE 1079.
3. Factory-fabricated, bolted, companion-flange assembly.
4. Pressure Rating: 125 psig minimum at 180 deg F.
5. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Central Plastics Company.
 - d. Pipeline Seal and Insulator, Inc.
2. Nonconducting materials for field assembly of companion flanges.
3. Pressure Rating: 150 psig.
4. Gasket: Neoprene or phenolic.
5. Bolt Sleeves: Phenolic or polyethylene.
6. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Elster Perfection Corporation.
 - b. Grinnell Mechanical Products; Tyco Fire Products LP.
 - c. Matco-Norca.
 - d. Precision Plumbing Products, Inc.
 - e. Victaulic Company.
2. Standard: IAPMO PS 66.
3. Electroplated steel nipple complying with ASTM F 1545.
4. Pressure Rating and Temperature: 300 psig at 225 deg F.
5. End Connections: Male threaded or grooved.
6. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Refer to manufacturers recommended installation instructions prior to installation of any piping system(s).
- C. If a non-plenum rated pipe material is found to pass through a plenum-rated ceiling immediately notify engineer of record prior to installation.
- D. Install copper tubing according to CDA's "Copper Tube Handbook."
- E. Braze all copper fitting connections on underground copper piping installations according to CDA's "Copper Tube Handbook."
- F. Install underground copper tube in PE encasement according to ASTM A 674 or AWWA C105/A21.5.
- G. Do not install domestic water piping within 6 inches of gas appliance vents or within 12 inches of any recessed light fixtures.
- H. Do not solder within 18 inches of plastic piping in the same waterline. Make all sweat connections prior to making plastic piping connections.
- I. Ensure no glues, solvents, sealants or chemicals come in contact with PEX tubing without prior permission from the tubing manufacturer.
- J. Protect plastic piping with sleeves where abrasion or cutting may occur.
- K. Use strike protectors where all domestic water piping penetrates a stud or joist and has the potential for being struck with a screw or nail.
- L. Install shutoff valve, strainer, backflow preventer, hose-end drain valve, pressure gage, and test tee with valve inside the building at each domestic water-service entrance.
- M. Install shutoff valve immediately upstream of each dielectric fitting.
- N. Install shutoff valves upstream and downstream of pressure-reducing valves. If not expressly indicated on drawings, provide a valve and bypass piping around pressure-reducing valves.
- O. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- P. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- Q. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- R. Install piping to permit valve operations and servicing.
- S. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

- T. Install piping free of sags and bends.
- U. Install fittings for changes in direction and branch connections. Do not bend piping unless allowable per manufacturers installation instructions.
- V. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- W. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- X. Drawings indicate general arrangement of piping, fittings, and specialties.
- Y. When installing piping adjacent to equipment and machines, allow space for service and maintenance.
- Z. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
 - 1. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
 - 2. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.2 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- D. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- E. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- F. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.3 QUALITY ASSURANCE

Installer Qualifications

Plumbing Contractor shall provide documentation that lists personnel assigned to this project prior to beginning construction who have successfully completed formal CPVC plumbing systems training conducted by an authorized CPVC manufacturer's representative. The Contractor Training documentation shall be specific to the manufacturer of the pipe and fittings. Personnel's training documentation must be current and have been updated within the past two (2) years. (Note: this training does not imply compliance with any local or state contractor certification or licensing laws.)

3.4 TRANSITION FITTING INSTALLATION

- A. Install transition couplings at joints of dissimilar piping.
- B. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

3.5 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings, nipples, or unions.
- C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges, flange kits, or nipples.

3.6 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for pipe hanger, support products, and installation in Section 220529.00 "Hangers and Supports for Plumbing Piping and Equipment."
 1. Vertical Piping: MSS Type 8 or 42, clamps.
 2. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Support vertical piping and tubing at base and at each floor.
- C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 1. NPS 3/4 and Smaller: 5 feet with 3/8-inch rod.
 2. NPS 1 and NPS 1-1/4: 6 feet with 3/8-inch rod.
 3. NPS 1-1/2 and NPS 2: 10 feet with 3/8-inch rod.
 4. NPS 2-1/2: 9 feet with 1/2-inch rod.
 5. NPS 3 to NPS 4: 10 feet with 1/2-inch rod.
- E. Install supports for vertical copper tubing every 10 feet.
- F. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

3.8 FIELD CONDITIONS

A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:

1. Notify Architect, Construction Manager, and Owner no fewer than seven days in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without Architect's written permission.

3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:
 - a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - 1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
 - 2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
 - c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
 - d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
2. Piping Tests:
 - a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 - b. Immediately drain system(s) following test if ambient air temperature has the possibility of dropping below 32°F.
 - c. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
 - d. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - e. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - f. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
 - g. Prepare reports for tests and for corrective action required.

3.10 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Repeat procedures if biological examination shows contamination.
 - e. Submit water samples in sterile bottles to authorities having jurisdiction.
- B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 221116.00

SECTION 221119.00 - DOMESTIC WATER PIPING SPECIALTIES**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

A. Product Data:

1. Provide product datasheets for all products specified under this section.
2. Clearly state full load amps (FLA), voltages and model numbers on all submittals.

1.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

PART 2 - PRODUCTS**2.1 BACKFLOW PREVENTERS**

A. Reduced-Pressure-Principle Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ames Fire & Waterworks; a division of Watts Water Technologies, Inc.
 - b. Conbraco Industries, Inc.
 - c. FEBCO; a division of Watts Water Technologies, Inc.
 - d. Flomatic Corporation.
 - e. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
 - f. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Accessories:
 - a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
 - b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
 - c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

B. Dual-Check-Valve Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cash Acme; a division of Reliance Worldwide Corporation.
 - b. Conbraco Industries, Inc.
 - c. FEBCO; a division of Watts Water Technologies, Inc.
 - d. Flomatic Corporation.
 - e. Ford Meter Box Company, Inc. (The).
 - f. Honeywell International Inc.
 - g. Legend Valve.
 - h. McDonald, A. Y. Mfg. Co.
 - i. Mueller Co. Ltd.; a subsidiary of Mueller Water Products Inc.
 - j. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.

2.
 3.
 4.
 5. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.

2.2 WATER-HAMMER ARRESTERS

- A. Water-Hammer Arresters:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AMTROL, Inc.
 - b. Josam Company.
 - c. MIFAB, Inc.
 - d. Precision Plumbing Products, Inc.
 - e. Sioux Chief Manufacturing Company, Inc.
 - f. Jay R. Smith Mfg. Co.
 - g. Wade.
 - h. Watts Water Technologies
 - i. Zurn Industries, LLC.
 2. Standard: ASSE 1010 or PDI-WH 201.
 3. Type: Metal bellows or copper tube with piston.
 4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.3 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Flex-Hose Co., Inc.
 2. Flexicraft Industries.
 3. Flex Pressure, Ltd.
 4. Flex-Weld Incorporated.
 5. Hyspan Precision Products, Inc.
 6. Mercer Gasket & Shim, Inc.
 7. Metraflex, Inc.
 8. Proco Products, Inc.
 9. TOZEN Corporation.
 10. Unaflex.Universal Metal Hose; a Hyspan company.
- B. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
 1. Working-Pressure Rating: Minimum 200 psig.
 2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.
 3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
3. Do not install bypass piping around backflow preventers.

B. Install water-hammer arresters in water piping according to PDI-WH 201.

END OF SECTION 221119.00

SECTION 221316.00 – DRAIN, WASTE, AND VENT PIPING**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

1. Provide product datasheets for all products specified under this section.
2. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.
3. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 2 - PRODUCTS**2.1 PERFORMANCE REQUIREMENTS**

- A. This specification is intended to include, but not limited to, sanitary, storm, and vent systems as they apply to the drain, waste, and vent piping products.
- B. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 1. DWV Piping: 10-foot head of water.
- C. Cast-iron DWV pipe and fittings shall be certified NSF and shall be marked with the trademark of the Cast Iron Soil Pipe Institute.

2.2 PIPING MATERIALS**A. HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS**

1. Pipe and Fittings: ASTM A 888, ASME B16.12, and CISPI 301.
2. Standard Hubless-Piping Couplings:
 - a. Standards: ASTM C 1277 and CISPI 310.
 - b. Description: Stainless-steel corrugated shield with (4) stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Charlotte Pipe and Foundry Corporation.
 - b. AB&I Foundry/ McWane, Inc.
 - c. Tyler Pipe/ McWane, Inc.
 - d. ANACO-Husky.
 - e. <http://www.specagent.com/LookUp/?uid=123456823627&mf=04&src=wdFernco Inc.>
 - f. MIFAB, inc.

2.3 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Shielded, Nonpressure Transition Couplings:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) ANACO-Husky.
 - 2) <http://www.specagent.com/LookUp/?uid=123456823627&mf=04&src=wdFer>
 - 3) MIFAB, inc.
 - b. Standard: ASTM C 1460.
 - c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
2. Dielectric Unions:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Spears Manufacturing Company.
 - 2) Watts Water Technologies, Inc.
 - 3) Zurn Industries, LLC.
 - b. Description:
 - 1) Standard: ASSE 1079.
 - 2) Pressure Rating: 125 psig minimum at 180 deg F.
 - 3) End Connections: Solder-joint copper alloy and threaded ferrous.
3. Dielectric Flanges:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Spears Manufacturing Company.
 - 2) Watts Water Technologies, Inc.
 - 3) Zurn Industries, LLC.
 - b. Description:
 - 1) Standard: ASSE 1079.
 - 2) Factory-fabricated, bolted, companion-flange assembly.
 - 3) Pressure Rating: 125 psig minimum at 180 deg F.
 - 4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
4. Dielectric-Flange Insulating Kits:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Advance Products & Systems, Inc.
 - 2) Calpico, Inc.
 - 3) Central Plastics Company.
 - b. Description:
 - 1) Nonconducting materials for field assembly of companion flanges.
 - 2) Pressure Rating: 150 psig.
 - 3) Gasket: Neoprene or phenolic.
 - 4) Bolt Sleeves: Phenolic or polyethylene.
 - 5) Washers: Phenolic with steel backing washers.

5. Dielectric Nipples:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Grinnell Mechanical Products.
 - 2) Matco-Norca, Inc.
 - 3) Precision Plumbing Products, Inc.
 - b. Description:
 - 1) Standard: IAPMO PS 66
 - 2) Electroplated steel nipple.
 - 3) Pressure Rating: 300 psig at 225 deg F.
 - 4) End Connections: Male threaded or grooved.
 - 5) Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

- A. Where new sanitary and/or storm sewers are required to be connected to existing sewer(s), it is the contractor's responsibility to verify the location, size, invert elevation, and condition of sewer. To avoid a misconnection of system types, the contractor shall verify that the existing sewer is indeed a sanitary and/or storm sewer before any work is done. Provide all necessary camera scoping and dye testing to complete proper field investigations. If there is any discrepancies between the existing sewer(s) shown on plan from actual field conditions, or condition(s) of the existing sewer(s) is not viable for re-use, or any other condition that would not allow the proper functioning of the new sewer, the contractor shall notify the engineer in writing immediately via RFI and wait for direction before proceeding.
- B. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 1. Notify Architect, Construction Manager, and Owner no fewer than seven days in advance of proposed interruption of sanitary waste service.
 2. Do not proceed with interruption of sanitary waste service without Architect's written permission.

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Slope piping according to local codes.

- F. Install piping free of sags and bends.
- G. Install piping to allow application of insulation.
- H. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- I. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- J. Collect vent piping where practical so roof will be penetrated a minimum number of times. Vent sizes and heights above roof shall be per the Plumbing Code in force. Vents penetrating roofs shall be flashed with 4 lb. sheet lead. Vents shall not be terminated within ten feet of any outside air intakes, windows, or door openings.
- K. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- L. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- M. PVC piping shall not be installed in plenum spaces. Coordinate plenum ceiling locations with engineer of record and HVAC contractor prior to bid submission.

3.3 JOINT CONSTRUCTION

- A. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
 1. Cast iron coupling for joining hubless cast iron pipe shall consist of neoprene gasket produced and labeled as ASTM C 564, cast iron clamps produced and labeled as ASTM A 48 and stainless steel bolts and nuts produced and labeled as ANSI B18.2.1 and ANSI B18.2.2. Neoprene gaskets shall be produced and labeled as ASTM C 564-70.

3.4 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
 1. Install transition couplings at joints of piping with small differences in OD's.
 2. In DWV piping: 4-band, shielded, non-pressure transition couplings.
- B. Dielectric Fittings:
 1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
 2. Dielectric Fittings for NPS 2 and Smaller: Use dielectric nipples or unions.
 3. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges, flange kits, or nipples.

3.5 CONNECTIONS

- A. Use transition fitting to join dissimilar piping materials.
- B. Connect drainage and vent piping to the following:
 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
 4. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.
- C. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- D. Make connections according to the following unless otherwise indicated:
 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.6 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping

system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.7 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.8 PIPING SCHEDULE

- A. Aboveground, DWV piping installed within an HVAC plenum shall be any of the following:
 1. Hubless, cast-iron soil pipe and fittings; hubless-piping couplings; and coupled joints.

END OF SECTION 221316.00

SECTION 221319.00 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

- A. Product Data (PD):**
 - 1. Provide product datasheets for all products specified under this section.
 - 2. Clearly state model numbers on all submittals.

PART 2 - PRODUCTS

2.1 CLEANOUTS

- A. Wall Cleanouts:**
 - 1. Cast-iron Wall Cleanouts:
 - a. Standard: ASME A112.36.2M. Include wall access.
 - b. Provide product equal to Zurn Z1445 cleanout body and plug complete with square wall access panel and frame equal to Zurn Z1460, smooth, stainless steel panel secured to frame, set flush to finish wall plane, complete with securing lugs.
 - c. 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) Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - 2) Watts Drainage Products Inc.
 - 3) Zurn Industries, LLC.

2.2 ADDITIONAL REQUIREMENTS

- A. If not expressly specified, the following drainage specialty products shall be equipped with and include, but are not limited to:**

2.3 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

- A. Through-Penetration Firestop Assemblies:**
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. 3M.
 - b. Hilti, North America.
 - c. ProSet Systems Inc.
 - 2. Standard: UL 1479 assembly of sleeve and stack fitting with firestopping plug.
 - 3. Size: Same as connected soil, waste, or vent stack.
 - 4. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.

5. Stack Fitting: ASTM A 48/A 48M, gray-iron, hubless-pattern, wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.

2.4 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

- A. No-hub Cast Iron Soil Pipe Fitting Restraints
 1. Description: CISPI Designation 301-12, large diameter no-hub cast iron fittings, over 4 inches (102 mm) in size, shall be provided with supplemental support to minimize the risk of joints separation under high thrust conditions. Auxiliary restraint products used shall be manufactured assemblies with thrust pressure rating adequate for the specific installation. Field devised methods and materials shall not be used to accomplish this application solution.
 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. HOLDRITE
 - b. EBAA Iron, Inc.
 - c. Romac Industries, inc.
- B. Floor-Drain, Trap-Seal Primer Fittings:
 1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
 2. Size: Same as floor drain outlet with NPS 1/2 side inlet.
- C. Sleeve Flashing Device:
 1. Description: Manufactured, cast-iron fitting, with clamping device, that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 1 inch above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
 2. Size: As required for close fit to riser or stack piping.
- D. Stack Flashing Fittings:
 1. Description: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
 2. Size: Same as connected stack vent or vent stack.
- E. Expansion Joints:
 1. Standard: ASME A112.21.2M.
 2. Body: Cast iron with bronze sleeve, packing, and gland.
 3. End Connections: Matching connected piping.
 4. Size: Same as connected soil, waste, or vent piping.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 2. Locate at each change in direction of piping greater than 45 degrees.

3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

D. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
 - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
 - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

E. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
2. Size: Same as floor drain inlet.

F. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

G. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.

END OF SECTION 221319.00

SECTION 223001.00 - THERMOSTATIC MIXING VALVES

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

- A. Product Data:
 - 1. Provide product datasheets for all products specified under this section.
 - 2. Clearly state voltages, if applicable, and all model numbers on all submittals.

PART 2 - PRODUCTS

2.1 POINT-OF-USE THERMOSTATIC MIXING VALVES FOR SINKS AND LAVATORIES

- A. Tempered water shall be delivered to all public hand-washing facilities including, but not limited to sinks and lavatories through an approved water-temperature limiting device that conforms to ASSE 1070.
- B. Set outlet temperature of thermostatic mixing valve to 105 degrees F.
- C. Route tempered water to hot water side of sink and/or lavatory.
- D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering valves which may be incorporated in the work include, but are not limited to, the following:
 - 1. Acorn
 - 2. Powers
 - 3. Leonard
 - 4. Bradley

PART 3 - EXECUTION

3.1 THERMOSTATIC MIXING VALVE INSTALLATION

- A. Provide all accessories in accordance with manufacturer's installation instructions.
- B. Provide check valves on the hot and cold-water inlet supply piping to each thermostatic mixing valve regardless if thermostatic mixing valve contains integral check valves. Check valve requirement shall not apply to point of use ASSE 1070 mixing valves serving lavatories, provided that valve has integral check valves.

END OF SECTION 223001.00

SECTION 224000.00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

A. Product Data:

1. Provide product datasheets for all products specified under this section.
2. Clearly state full load amps (FLA), voltages (where applicable) and model numbers on all submittals.
3. Include material descriptions, dimensions of individual components and profiles, and finishes for fixtures.
4. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
5. Include diagrams for power, signal, and control wiring of automatic fixtures where applicable.

1.2 EXTRA MATERIALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents as indicated below:

1. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed but not less than one.

PART 2 - PRODUCTS

2.1 STAINLESS STEEL SINKS

A. Stainless Steel Sinks:

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. Acorn Engineering Co.
 - b. Advance Tabco.
 - c. Amtekco Industries, Inc.
 - d. Elkay Manufacturing Co.
 - e. Just Manufacturing.
 - f. Eagle Group; Foodservice Equipment Division.
 - g. Kohler Co.
 - h. American Standard America.

2.2 FAUCETS

A. Lavatory, Sink, Bathtub, and Shower Faucets:

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. American Standard America.

- b. Bradley Corporation.
- c. Chicago Faucet Company.
- d. Delta Faucet Company.
- e. Elkay Manufacturing Co.
- f. Just Manufacturing.
- g. Kohler Co.
- h. Speakman Company.
- i. T & S Brass and Bronze Works, Inc.
- j. Zurn Industries, LLC; Commercial Brass and Fixtures.
- k. Symmons Industries, Inc.
- l. Powers, Watts Water Technologies Co.
- m. <http://www.specagent.com/LookUp/?uid=123456810699&mf=04&src=wdSloan>
Valve Company.

2.3 SUPPLY FITTINGS

- A. Standard: ASME A112.18.1/CSA B125.1.
- B. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.
- C. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.
- D. Risers:
 - 1. NPS 1/2.
 - 2. Chrome-plated, rigid-copper-pipe and brass straight or offset tailpieces, chrome-plated, soft-copper flexible tube, ASME A112.18.6, braided- or corrugated-stainless-steel, flexible hose riser.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General Fixture Installation:
 - 1. Install fixtures level and plumb according to manufacturer's rough-in drawings.
- B. Traps:
 - 1. Install traps on fixture outlets.
 - a. Exception: Omit trap on fixtures with integral traps.
 - b. Exception: Omit trap on indirect wastes unless otherwise indicated.
- C. Lavatory, Sink, and Laundry Tray Installation:
 - 1. Install level and plumb according to roughing-in drawings.
 - 2. Install supports, affixed to building substrate, for wall-mounted lavatories.
 - 3. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.
 - 4. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."
 - 5. Provide independent check valves in both hot and cold water supply piping serving thermostatic mixing valves.

6. Install counter-mounting fixtures in and attached to casework.
- D. Faucet Installation:
 1. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
 2. Provide independent check valves in both hot and cold water supply piping serving thermostatic mixing valves.

END OF SECTION 224000.00

SECTION 230170.00 - OPERATION AND MAINTENANCE OF HVAC SYSTEMS**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

- A. Shop Drawings
 - 1. As-Built Drawings
 - a. For recording installed conditions that deviate from design documents.
- B. Closeout
 - 1. Operation and Maintenance Manual
 - a. For equipment and systems to include in operation and maintenance manuals.

1.2 OPERATING AND MAINTENANCE MANUALS

- A. The contents of operating and maintenance manuals shall include the following:
 - 1. Project Information Cover: Title of Project; Name and address of Owner, Design Professionals, Contractor of Record and Subcontractor; System name and specification references.
 - 2. Index: Contents of the manual.
 - 3. Warranty Statements: Furnish a warranty statement for each system, reiterating the terms of warranty identified within the Contract Documents, and identifying how the Owner is to obtain warranty service. Clearly identify which products are covered by Manufacturer warranties beyond the Contractor required minimum warranty period. The term of manufacturer warranty shall also be identified (e.g., 1-year parts and labor). Identify the date that the warranty for the system starts. This date shall be the date listed on the Certificate of Substantial Completion (if one was issued to the contractor specifically for the system) or the date listed on the Notice of Final Completion. Supply standard out-of-warranty service rates and service contact information.
 - 4. Bill of Materials: List of products supplied, and serial numbers of each product.
 - 5. Product Datasheets and Shop Drawings: Manufacturer datasheets and shop drawings for each product and system supplied.
 - 6. Manufacturer Owner / User Manuals: Manufacturer's Owner's or User's manual for each product, and Manufacturer's Installation instructions and other documentation supplied with the product.
 - 7. Spare and Replacement Parts Schedule:
 - a. Complete spare parts schedule for components of equipment furnished, which are not factory generic information, but accurate for the equipment provided.

8. Maintenance Procedures: Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; testing, aligning and adjusting instructions.
9. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments. Function and Operating Descriptions: Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
10. Operating Procedures: Manufacturer's printed operating procedures including start-up, break-in, normal operating instructions, regulation, control, stopping, shutdown, and emergency instructions.
11. Test Reports and Checklists: Test reports, checklists, and other forms generated and completed for the Project.
12. Training Information: Copy of training outlines/agendas, training session handouts, training sign-in sheets, and signed delivery receipt for each training session recording; Separate USB drive, labeled, for audio/video-recorded instructions to Owner, for operations and maintenance for each system.
13. As-Built Drawings.

B. Organization - A manual of such purpose shall be arranged in two parts, with Part I dealing with information pertaining to systems and Part II covering information pertaining to equipment. These may be bound in as many volumes as may be required for convenience of use and reference.

1. Part 1 - Systems:
 - a. The systems volumes shall be organized into Divisions wherein each Division represents a generic function. Systems shall be classified under appropriate Divisions. An example of such an arrangement is as follows:
 - b. Division Title Division No.
 - 1) Ventilating
 - a) Building Exhaust
 - c. The material for each system shall be organized in sections descriptive of the following basic areas of information:
 - 1) Descriptive Information.
 - 2) Operating Instructions.
 - 3) Inspection and Maintenance Instructions.
 - d. Sections could be organized to include the following categories of information:
 - 1) Descriptive Information
 - 2) Function of service.
 - 3) Classification.
 - 4) Design capability.
 - 5) Performance characteristics.
 - 6) Principal components.
 - 7) Distribution arrangement.
 - 8) Schematic diagram.

- 9) Control diagram.
- 10) Equipment Data.
- 11) Inventory designation.
- 12) Manufacturer and model.
- 13) Size and rating.
- 14) Pressure, speed and temperature limitations.
- 15) Operating Instructions.
- 16) Starting and stopping procedures.
- 17) Adjustment and regulation.
- 18) Seasonal start-up.
- 19) Seasonal shut-down.
- 20) Logs and records.
- 21) Inspection and Maintenance.
- 22) Inspection schedule and checklist.
- 23) Schedules and procedures for lubrication, replacements, adjustment, cleaning, painting, protection and testing.
- 24) Inspection and maintenance records.

- e. Reference Documents:
 - 1) Construction drawing list.
 - 2) Construction specifications.
 - 3) Record drawings.
 - 4) Test and balance records.

2. Part 2 - Equipment:
 - a. This part of the manual shall be composed of manufacturers and fabricators data on equipment and materials organized into divisions wherein each division represents a generic classification of equipment such as:
 - b. Division Title
 - 1) Air Conditioning and Ventilating
 - 2) Controls
 - 3) Instrument and Accessories
 - c. Each division shall be organized in sections wherein each section would represent a specific type of equipment in Division 1, the sections shall include the following:
 - 1) Air Conditioning and Ventilating
 - a) Coils - Cooling
 - 2) Fans
 - a) centrifugal
 - d. Each section shall include the following manufacturer information:
 - 1) Descriptive Literature
 - a) Catalog cuts, brochures or shop drawings
 - b) Dimensional drawings
 - c) Materials of construction
 - d) Parts designations
 - 2) Operating Characteristics
 - a) Performance tables and charts
 - b) Performance curves

- c) Pressure, temperature and speed limitations
 - d) Safety devices
- 3) Equipment Startup Sheets
 - a) Complete equipment configuration settings
- 4) Operating Instructions
 - a) Pre-start check list
 - b) Start-up procedures
 - c) Inspection during operation
 - d) Adjustment and regulation
 - e) Testing
 - f) Detection of malfunction
 - g) Precautions
- 5) Inspection Instruments and Procedures
 - a) Normal and abnormal operating temperature, pressure and speed limits
 - b) Schedule and manner of operation
 - c) Detection signals
- 6) Maintenance Instructions and Procedures
 - a) Schedule of routing maintenance
 - b) Procedures
 - c) Troubleshooting chart
- 7) Parts List
 - a) Spare Parts
 - b) Essential inventory
 - c) Distributor directory
- 8) Service and Dealer Directory
- 9) Service Contracts

PART 2 - PRODUCTS (NOT USED)**PART 3 - EXECUTION****3.1 INSTRUCTIONS FOR THE OWNER'S PERSONNEL**

- A. Train or engage for factory-authorized service representative to train Owner's operating and maintenance personnel. Provide instruction in the proper operation and maintenance of equipment that requires routine servicing. Include the following:
 - 1. Review of operation and maintenance manuals.
 - 2. Required tools.
 - 3. Lubricants.
 - 4. Spare parts.
 - 5. Cleaning.
 - 6. Hazards.
 - 7. Warranties and maintenance agreements.
- B. Demonstrate equipment and systems operation including the following:
 - 1. Start-up.
 - 2. Shut-down.

3. Emergency conditions.
4. Safety procedures.
5. Setpoint and schedule adjustments.
6. Economy and efficiency adjustments.

END OF SECTION 230170.00

SECTION 230501.00 - COMMON REQUIREMENTS FOR HVAC**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

- A. Shop Drawings
 - 1. Coordination Drawings
 - a. This contractor shall provide necessary coordination drawings required to make sure all disciplines are coordinated and fit into specified spaces (i.e. ceilings, chases, and all others). It is the work of the contractor to prepare complete coordination drawings indicating exact location, clearances and penetrations of all items of all trades.

1.2 RELATED DOCUMENTS

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

1.3 GENERAL DIRECTION

- A. Submittal of a bid indicates that the contractor has examined the drawings, specifications, and had an opportunity to visit the site to be able to provide a comprehensive complete bid.
- B. The intent of these specifications and the accompanying drawings is to provide complete and workable systems as shown, specified and required by applicable codes. Interpret these specifications in conjunction with the drawings and provide all work described. If work is shown on drawings and not mentioned in the specifications, or vice versa, it is to be included in the work the same as though clearly set forth by both. Should there be a conflict between the specifications and drawings, provide the greater quantity or better quality. Immediately notify owner's representative and design professional of such conflicts.
- C. The drawings that accompany these specifications are diagrammatic and although size and location of equipment is drawn to scale wherever possible make use of submittal data and verify all dimensions on site. They do not show every offset, bend, tee, or elbow which may be required to install work in the space provided and avoid conflicts. Follow the drawings as closely as is practical and install additional bends, offsets and elbows where required by site conditions and codes at no additional cost. Install all new work in such manner as to conform to the structure, avoid obstructions, provide required service clearances and preserve headroom. Do not scale from drawings, all measurements should be taken in the field.
- D. Coordinate all work with all other contractors and installers in addition to existing building obstructions and install accordingly. Comply with requirements of architectural drawings including but not limited to mounting height and locations. Fully research peculiarities and limitations of space available for installation of work with materials being provided. Work around material lead times to not extend project schedule.
- E. Complete work, or part(s) thereof, at times as may be designated by the Owner's Representative, so that it can be used for temporary or permanent use. Do not construe such use of the system as an acceptance of it by Owner.

- F. During mobilization or construction, if an abnormal condition is uncovered either with existing conditions, equipment loads, submittal data, etc. bring these to the attention of the Design Professional for review.
- G. Owner's Representative or Design Professional may relocate devices prior to installation within a 20-foot limit at no additional charge.
- H. All ducts shall be run as straight as possible and symmetrical with architectural items. Ductwork fabricated before coordination with the other trades will be done at the contractor's risk.

1.4 GENERAL STANDARDS

- A. Provide materials, installation methods, workmanship, testing, etc., in strict accordance with the latest edition of applicable standards and adopted codes, including (but not limited to) the following.
 - 1. State Building Code and applicable local amendments.
 - 2. Local Building Code (if applicable)
 - 3. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).
 - 4. American Society of Test Materials (ASTM)
 - 5. National Fire Protection Association (NFPA)
 - 6. Underwriters Laboratories (UL)
 - 7. National Sanitation Foundation (NSF)
 - 8. Sheet Metal & Air Conditioning Contractors National Association (SMACNA)
 - 9. American National Standards Institute (ANSI)
 - 10. Building Code Seismic Relative Displacement Requirements

1.5 PERMITS AND REGULATIONS

- A. Obtain and pay for permits, fees, certificates of inspection and approval, etc. required for this branch of the work. Furnish Owner with certificates of final inspection and approval prior to final acceptance of this branch of the work.
- B. Laws and regulations which bear upon or affect the various branches of this work shall be complied with by this contractor and are hereby made a part of this contract.

1.6 DEFINITIONS

- A. Furnish - Procure, supply and deliver to project site, ready for installation, install and warrant (unless indicated otherwise on documents). Include warranty expenses.
- B. Install - To supply labor, tools and incidental materials necessary to handle, store, mount, terminate, program, configure and adjust a product in order render the respective product and system fully operational and usable to the Owner for the intended purpose
- C. Provide - Furnish and Install. Similar Terms: "include", "shall", "equip with", "consisting of".

- D. Equal or Equivalent - Determination of equivalency to be made by design professional for all products not listed as basis-of-design.
- E. Substantial Completion - Where frontend documentation does not define, products and systems must be fully installed as designed, tested, adjusted, labeled, and functionally demonstrated to owner.

1.7 REQUESTS FOR INFORMATION

- A. Submit all questions, requests for information (RFIs) and similar queries through the formally-established RFI process for the project that has been accepted by the Owner's Representative, Design Professionals, Prime Contractor and subcontractors. Submit as a PDF file. Do not submit as text in an email.

1.8 AVAILABILITY OF ELECTRONIC DRAWINGS

- A. If expressly permitted by the Owner and the terms of the Contract, editable electronic drawings may be made available for the creation of shop and as-built drawings upon request. Drawings will be made available at the discretion of the Engineer.
- B. "Request Drawings" form can be accessed, filled out and submitted at <http://www.klhengrs.com> (right hand side of page - Contractor Resources). Direct access to this form can be found here: <https://apps.klhengrs.com/drawingrequests>

1.9 QUALITY ASSURANCE

- A. Contractor shall have a minimum five (5) years experience in the installation of systems similar to the systems specified. Contractor, if requested, shall demonstrate his ability to perform all work to be included under the contract. Assurance if requested, shall be in the form of a list of past projects of similar size and complexity and a list of six (6) references pertaining to those projects. Failure to demonstrate these quality assurances shall be taken as a statement of the contractor's inability to perform.

1.10 WARRANTY / GUARANTEE

- A. Provide a warranty/guarantee in written form as part of O&M manual stating that all work, materials, equipment and parts are warranted to be free of defect for a minimum period of one year from the date of Substantial Completion. Warranty period and requirements may be expanded in drawings or subsequent specification sections. Repair or replace (owner's option) any defects or failures at no cost to the owner within the warranty period. Issues arising within warranty period must be attended to in a timely manner and in no case exceed four (4) working days. State this in writing as part of O&M manual. Replace defective items to the satisfaction of the Owner's Representative and the Design Professional.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Provide materials that are new, full weight, of the best quality. Obtain equipment, components and materials from single manufacturer for products of the same kind or category. Provide materials that are listed and labeled and marked for intended location and application.
- B. Provide basis of design products or listed products equivalent in quality, performance, aesthetics, and product support (factory and local) to that specified as basis of design. Products not basis of design are subject to review by the Design Professional and possible rejection.

Listing of a product manufacturer by name alone as an equivalent manufacturer shall not equate all products offered by that manufacturer to the basis of design.

- C. Bear all costs incurred from deviation from basis-of-design materials, methods, labor, services, etc. Use of materials, methods, labor, services, etc. that deviate from the basis-of-design will be considered a statement that capacities, requirements, clearances, arrangements, performance, etc. have been checked, verified, found satisfactory, and align with intent of specified work and applicable codes and regulations.
- D. Should deviation from basis of design equipment impact other contractors scope of work it shall be the responsibility of this contractor to coordinate with and cover these costs in addition to their own. This specifically includes electrical deviations from basis of design.
- E. All manufacturer or contractor provided electrical disconnect switches shall comply with current National Electric Code requirements and rated to meet or exceed the overcurrent device serving the equipment.

PART 3 - EXECUTION

3.1 GENERAL DIRECTION

- A. Unless specifically indicated, provide all specified and drawn work as required to render all equipment and systems fully operational, including all ancillary, accessory, and support work. Install equipment and materials in strict accordance with manufacturer's written instructions.
- B. In cases where products / materials are furnished by Owner or others, provide the following services: receive, transport and securely store materials on site; remove materials and components from packaging; assemble all materials and components per factory instructions; install, wire and connect materials and components as recommended by manufacturer for a fully operational installation.
- C. Remove and replace items that impede new work installation including but not limited to fencing, doors, gypsum, lift-out panels, and structures to provide pathway for moving equipment into place.
- D. Examine surfaces to receive products for suitable mounting conditions and verify compliance with installation tolerances and other conditions affecting performance of the work. Proceed with installation only after unsatisfactory conditions have been corrected.
- E. Equipment shall be installed in accordance with manufacturer's installation recommendations. Provide and maintain service, maintenance and operating clearances as required by the manufacturer.

3.2 SUPERVISION AND WORKMANSHIP

- A. Workmanship throughout shall conform to the standards of best practice and all labor employed must be competent and qualified to do all the work required.
- B. Contractor shall furnish the services of an experienced superintendent to be in constant charge of the work at all times. The superintendent's qualifications are subject to the review and acceptance by the Owner's Representative. Utilize the same mechanical superintendent throughout the duration of the project.
- C. Provisions shall be made for owner's representative or design professional to make rough-in and open ceiling inspections prior to covering up work.

3.3 CHANGE OF WORK

- A. In the event of revised scope or work formally issued through Change of Work order, contractor shall provide an itemized breakdown of pricing and receive approval prior to commencing work.

3.4 ARCHITECTURAL COORDINATION ITEMS**A. Cutting and Patching:**

- 1. Cut and drill all openings in roofs, walls, and floors required for the installation. Neatly patch all openings cut. Hold cutting and patching to a minimum by arranging with other contractors for all sleeves and openings before construction is started.

B. Fire Caulking:

- 1. Patching through fire rated walls and enclosures shall not diminish the rating of that wall or enclosure. Patch shall be equal to rockwool, firestop, caulk or approved "rated" patch.
- 2. Provide products equivalent to the following:
 - a. For Floor Openings: 3M; Fire Barrier Sealant CP 25WB+
 - b. For Wall Openings: 3M; Fire Barrier Sealant CP 25WB+
 - c. Mineral Felt: Rockwool; Firepro Firestop Compound
 - d. For Insulated Pipes: 3M; Fire Sealant System CAJ5211
 - e. For Fill Areas: 3M; Fire Barrier Packing Material PM 4
- 3. For larger openings where pipes penetrate fire rated enclosures that cannot be sealed with products described above, utilize approved UL products equal to 3M FireDam Spray 200.

C. Access Panels:

- 1. Provide all access panels required for proper servicing and replacement of equipment. Provide fire rated access panels at fire rated assembly penetrations rated at or above the fire rating of the assembly. Provide frame as required for finish. Coordinate installation with General Contractor as they may elect to install access panel. Exact location(s) must be approved by the Architect. Minimum size to be 12" x 12", units to be 16-gauge steel, primed for paint, and locking device shall be screwdriver cam locks.
- 2. For equipment above gypsum board or "hard ceilings", provide equipment access panels sized to permit complete holistic removal of the unit in its entirety. Access panel shall also be sized to accommodate removal of the largest piece of equipment in the case where such access panel is used as a removal pathway for multiple pieces of equipment.

D. Expansion Joints:

- 1. Provide flexible connectors where all ducts cross building expansion joints. Coordinate exact quantity & location with Architectural plans prior to installation of piping or ductwork.

3.5 PROTECTION OF SURFACES

- A. Make every effort to protect roofs, walls and floors from foot traffic, equipment, carts, lifts, etc.
- B. Make roof penetrations and install insulated roof curbs and flashing in accordance with roofing manufacturer's recommendations. Obtain written certification from roofing manufacturer that work has been performed properly and that roof warranty is intact.

3.6 UTILITY VERIFICATION REQUIREMENTS

- A. Field verify locations of underground and aboveground utilities, or those otherwise obscured from view, in the vicinity of work prior to commencing work. Utilize "811" call before you dig and hire locating service to identify, locate and mark remaining utilities and private lines.
- B. Camera scope and dye testing existing piping, ductwork and pathways to confirm existing conditions and use including, but not limited to, voltage, natural gas pressure, sanitary, storm, chilled water, steam, etc.)
- C. Obtain on-site approval from local utility prior to connecting to existing services.
- D. Failure to perform the above shall result in contractor proceeding at their risk and accepting full responsibility for incorrect connections.

3.7 DELIVERY, STORAGE, HANDLING, AND PROTECTION

- A. Receive, inspect, store and protect all materials required for new work. Do not accept or install any product damaged in any way.
- B. Comply with all manufacturer guidelines and requirements for movement, storage, and protection of new work. All new work must be stored in a clean, dry place protected from weather and construction traffic. Maintain acceptable temperature and humidity per manufacturer recommendations. When stored inside or during transport through building, do not exceed structural capacity of the floor.
- C. Coordinate and account for sizes of all new work included shipping materials with available openings. Account for rigging of all new work as required and as intended by manufacturer.
- D. Do not install work until work area is sufficiently weathertight, all wet work in area is complete and all work above is complete.
- E. Prior to installation, all products shall have the ability to be returned to the supplier or manufacturer after purchase and charged a reasonable restocking fee equal to a small portion of the cost.
- F. Protect all new work through construction from damage. Take safeguards necessary to protect from damage. Items damaged during construction will not be accepted and shall be replaced with new.
- G. Remove and replace all materials that have been installed improperly, physically damaged, moisture or water damaged, or mold damaged.
- H. Fully remove all packaging materials inside and out prior to startup.

3.8 FIRE ALARM RELATED WORK FOR MECHANICAL SYSTEMS

- A. The drawings and specifications for this project require specific fire alarm devices, connections, wiring and programming associated with this division of work.

- B. Provide new fire alarm components/system or modifications of existing fire alarm components/system to satisfy the requirements of this division of work. This work may be subcontracted but will remain the responsibility of this contractor. Quality Assurance requirements of this specification shall apply to this subcontractor.
- C. Provide all necessary working drawings and submittals (wiring diagrams, zone schedule, plan view layouts, routing, wiring, device & panel submittals, etc.). These submittals shall be reviewed by the State Fire Marshall's office (or a similar agency as locally required) prior to submittal to engineer. All components shall be UL listed and NFPA approved for their specific application. Where control panels are required, provide remote annunciator (at location as directed in field) and provide full battery back-up as required by NFPA.
- D. All fire alarm devices shall be specifically listed for use with new or existing fire alarm panel(s) where needed and shall be provided with all required power supply/alarm wiring, sampling tubes, test station, auxiliary contacts, etc.
- E. All work shall be in strict compliance with all applicable sections of the latest edition of NFPA. All new panels required shall be addressable. All fire alarm system wiring shall be supervised and installed in conduit (3/4" minimum).

3.9 STARTUP, TESTING AND ADJUSTMENTS

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Unit may be started up and utilized only after the floor has been prepared and after drywall sanding has occurred 100%. Coordinate with all trades prior to startup.
- B. Adjust hardware and moving parts to function smoothly and lubricate as recommended by manufacturer.

3.10 CLEANING EQUIPMENT AND PREMISES

- A. Vacuum, clean and wipe down all new work and equipment inside and out. Exposed parts which are to be painted shall be cleaned of all foreign objects and prepped for paint.
- B. During the progress of work, clean up and leave the premises and portions of the building in which work has occurred in a clean and safe condition. Provide this cleaning on a per-shift basis.

3.11 DEMONSTRATION / TRAINING

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

END OF SECTION 230501.00

SECTION 230505.00 - EXISTING CONDITIONS AND DEMOLITION**PART 1 - GENERAL****1.1 DESCRIPTION OF WORK**

- A. Prior to submitting a bid, the Mechanical Contractor shall perform a detailed walk-through field inspection, to review the existing structures and premises, to determine all existing conditions, equipment/ductwork/piping locations, etc. and shall make all necessary allowances for all required mechanically related demolition and relocation work. This pre-bid inspection by the Mechanical Contractor shall include inspection of all applicable accessible ceiling cavity, areas, etc.
- B. Should the Mechanical Contractor take any exceptions to providing any related demolition or relocation work, such exceptions shall be stated in detail within the Prime Contractor's bid. No subsequent allowance to the contract cost shall be made for any insufficient allowances made by the Mechanical Contractor during bidding which may result from the Mechanical Contractor's failure to visit job site and review drawings.
- C. The Mechanical Contractor shall confirm the working operation and condition of existing systems to remain. The Mechanical Contractor shall note any malfunctioning systems, system deficiencies or any other noteworthy system items prior to commencement of work. The Mechanical Contractor shall provide a written systems condition assessment report to the owner prior to commencement of work. The owner shall sign the assessment report acknowledging the condition of the existing systems. The Mechanical Contractor shall protect these existing systems and shall be responsible for these systems during demolition and construction. The Mechanical Contractor shall be responsible for turning these existing systems back over to the owner in the same operating condition as the contractor received it. The mechanical contractor shall be responsible for repairing or replacing any malfunctioning systems, components or deficient systems to the satisfaction of the owner that have not been noted on the written systems condition assessment report. The mechanical contractor shall be responsible for all existing system components and operation in the absence of an owner-signed systems condition assessment report.
- D. Demolition related work may not be specifically indicated on drawings, but shall be included under base bid. All mechanically related demolition, relocation, etc. work, including work described herein, shall be under base bid.
- E. It is not the intent of these contract documents that existing conditions be accurately shown. Existing mechanical work is shown to a limited extent on drawings and is shown for general planning reference only. Such locations, etc. have been located from portions of contract documents which were prepared for previously installed work (not from "as-builts"). These locations are not guaranteed. The successful Mechanical Contractor shall have access to all available existing building/system plans and specifications.
- F. The existing ductwork systems may be utilized only to the extent indicated herein or on drawings and/or as directed by Owner's representative in field.
- G. Routing of all new ductwork in existing buildings shall be approved by Owner's representative prior to installation.

PART 2 - PRODUCTS**2.1 NOT USED**

PART 3 - EXECUTION**3.1 EFFECT ON ADJACENT OCCUPIED AREAS**

- A. Locate, identify, and protect existing mechanical services passing through demolition areas and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services (including proper filtration) for affected areas.
- B. It is recognized that there may be some ductwork and/or piping systems rendered inactive by demolition, causing disconnection of "downstream" terminals, equipment, etc. which serve occupied areas. It shall be the responsibility of the Mechanical Contractor to investigate these types of conditions (for all systems) prior to demolition. Provide all necessary corrective mechanical work prior to demolition to ensure that such "downstream" work remain permanently active throughout demolition, new construction and after project completion.
- C. All work and system shutdowns shall be carefully coordinated in advance with owner's representative and all affected trades so that normal building activities and other construction trades are minimally affected. All required mechanical related demolition and/or new construction work, which will affect any and all occupied areas (including those which are located outside the immediate area of project work) shall be performed at special times if/as directed by Owner's representative in field.
- D. All existing systems and components shall remain fully operational in all occupied spaces during all occupied periods.
- E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent finished areas and/or other system components. During cutting and patching operations, protect adjacent installations. Remove protection and barriers after demolition operations are complete.

3.2 WORK IN EXISTING SPACES

- A. General: Care shall be taken when working in existing spaces so as not to damage existing walls and ceilings where work is being performed.
- B. Existing Ceilings: Where work is being performed above existing ceilings, and the architectural drawings do not indicate ceiling modifications by the General Contractor, it shall be the responsibility of this contractor to remove and replace existing ceilings where work is being performed. In those instances, all repair and installation of new grid, ceiling panels, etc shall be the responsibility of this contractor. Match existing finishes.
- C. New Ceilings: Where existing air outlets are to remain, and the architectural drawings indicate replacement of the ceilings, this contractor shall temporarily remove air outlets, clean and store temporarily. This contractor shall support existing run outs to structure to facilitate replacement of ceiling. This contractor shall re-install existing air outlets at previous locations and extend run outs to air outlets after new ceiling is installed. Refer to architectural drawings for all required ceiling replacements. Coordinate with all trades prior to re-installation.
- D. Walls & Floors: It shall be the responsibility of this contractor to patch existing walls and floors and match existing finishes where work is being removed or installed and patching is being performed, unless noted otherwise on the architectural drawings.
- E. HVAC Units: Replace all air filters in all HVAC equipment serving renovated space prior to turning space over to owner.

F. If asbestos, PCB's, or other hazardous materials are encountered in the course of the work, stop work in the vicinity of such materials and report their presence to the Owner. Owner will arrange for proper removal and disposal of hazardous materials.

3.3 GENERAL DEMOLITION

A. Provide complete mechanical demolition as required for all systems throughout all project areas not indicated to be salvaged or saved. Unless specifically noted otherwise on plans or determined otherwise during this contractor's pre-demolition survey, all abandoned existing mechanical work in the project areas shall be disconnected and removed in its entirety by the Mechanical Contractor. All related work shall comply with the notes specified herein.

B. Provide demolition work as required to clear and remove all existing mechanical work to be abandoned and as required to accommodate all new work of all trades. In general, remove existing related ductwork, piping, control media, etc. back to nearest concealed accessible terminal or take-off "upstream". Extend ductwork, piping, etc. as required to accommodate new or relocated mechanical work.

C. Remove abandoned, inactive and obsolete equipment, ductwork, piping, etc. Abandoned work embedded in floors, walls, and ceilings may remain if such materials do not interfere with new installations. Remove all abandoned materials above accessible ceilings.

D. Perform cutting and patching required for demolition in accordance with the contract documents.

E. All abandoned ductwork shall be removed and capped back to respective sources, even if sources are outside of the confines of the project area. Coordinate all work carefully with Owner prior to beginning any mechanical demolition work.

F. All ductwork, piping, etc. conflicting with construction related work of any and all trades shall be removed and/or relocated by the Mechanical Contractor as necessary and/or as directed by Owner's representative in the field. Mechanical disconnections (and/or reconnections) for equipment to be removed (and/or relocated) shall be by the Mechanical Contractor. This shall apply to all existing mechanical work whether shown on drawings or not.

G. Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment not indicated to be salvaged.

H. Provide new work as required to accommodate relocations, etc. Routing of all new ductwork in existing buildings shall be held tight to structure above wherever possible and shall be approved by owner's representative prior to installation.

3.4 DISPOSITION OF REMOVED EQUIPMENT & MATERIALS

A. If required to accommodate construction related activities, remove and reinstall any conflicting fixtures, devices or equipment that are to remain.

B. All abandoned materials removed during demolition and thereafter shall be referred to the Owner's representative for disposal instructions. All materials which the Owner elects to retain shall be neatly stored at the site by the Mechanical Contractor as designated by the Owner's representative. All materials which the Owner elects not to retain shall be disposed of by the Mechanical Contractor in a lawful manner.

C. All fixtures, devices or equipment designated for salvage (removal and reuse, or for turning over to Owner) shall be disconnected and removed undamaged. Disconnect all pigtails, etc. from equipment terminal points and carefully transport and neatly store same to a protected on-site

storage location as directed in field.

- D. Components to be reused shall be cleaned (inside and out) and reinstalled where indicated on drawings. Modify and/or extend related existing ductwork and/or piping as required.
- E. Components turned over to Owner shall be neatly stored as groups by system type.

3.5 PRE-EXISTING CODE VIOLATIONS

- A. All existing work which is accessed and/or used under this project shall be inspected and brought into compliance with current codes and standards by the Mechanical Contractor. This shall apply only to the extent that such work is uncovered in the immediate project areas affected by demolition and/or new construction and only to the limited extent that it applies to pre-existing general installation methods (i.e. a missing hanger/support, a missing seal and other minor incidental work).
- B. If more extensive code or safety violations are discovered by the Mechanical Contractor, they shall be immediately brought to the attention (detailed in writing) of the Owner's representative along with the contractors proposed cost for corrections.

3.6 INTERIM LIFE SAFETY WORK

- A. Provide interim fire protection (sprinkler) work in all demolition and construction areas for full code coverage. Further definition will be provided in field if required.

3.7 INTERIM INDOOR AIR QUALITY (IAQ) WORK

- A. All requirements of this IAQ subsection shall be implemented prior to commencement of any demolition/construction activities.
- B. No airborne dust or particulate matter shall be permitted to enter any occupied spaces or any air intakes to existing systems.
- C. Become familiar with all affected HVAC systems to ensure that positive pressure can be maintained, relative to construction areas, in all areas adjacent to construction areas. This shall include all possible operational sequences of all systems such, including operation of smoke control, fire dampers, etc.
- D. All return air and exhaust air terminals within all demolition/construction spaces shall be covered and properly sealed until construction is complete.
- E. All air filters shall be checked at the beginning and end of each work shift and shall be changed in-kind as required to permit free airflow at all times.
- F. Provide temporary exhaust throughout all demolition/construction spaces to ensure proper negative pressure is maintained relative to adjacent areas, including allowances for normal construction traffic through all access doors. Ensure that no windows or doors are left open which could upset the desired negative pressure.
- G. Designate a dedicated qualified person to be on site to monitor all IAQ requirements, including checking filters three to four times per shift, checking for any breeches (by any contractor) such as drilled/cut openings in walls/floors, open windows, etc. Ensure that openings through walls and floors (by any contractor) are made immediately prior to installation of work and properly/permanently sealed immediately thereafter.

END OF SECTION 230505.00

SECTION 230553.00 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

- A. Product Data
 - 1. Provide for each type of product indicated.
- B. Shop Drawings
 - 1. Equipment Label Schedule
 - a. Include a listing of all equipment to be labeled with the proposed content for each label.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. General: Subject to compliance with requirements, provide mechanical identification materials of one of the following:
 - 1. Brady (W.H.) Co., Signmark Div.
 - 2. Brimar.
 - 3. Seton Name Plate Corp.

2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
- B. Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - 1. Size: Approximately 4 by 7 inches.
 - 2. Fasteners: Brass grommet and wire.
 - 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 - 4. Color: Yellow background with black lettering.
- C. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- D. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- E. 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.
- F. Fasteners: Stainless-steel rivets or self-tapping screws.

- G. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- H. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
 - 2. Letter Color: Black.
 - 3. Background Color: White.
 - 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
 - 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 - 6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 7. Fasteners: Stainless-steel rivets or self-tapping screws.
 - 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.4 DUCT LABELS

- A. Material and Thickness: Multilayer, multicolor, pre-printed, self-adhesive plastic labels.
- B. Letter Color: White.
- C. Background Color: Blue, red, orange and green.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 inches by 3/4 inch.
- F. Minimum Letter Size: 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.
- G. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- H. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.

2. Lettering Size: At least 1-1/2 inches high.

PART 3 - EXECUTION

3.1 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

3.2 EQUIPMENT LABEL INSTALLATION

- A. The contractor shall provide labeling for each piece of equipment above the ceiling. Labeling shall be on ceiling grid (not ceiling tile) below the equipment. The label shall match the equipment identification shown on the drawings sheet.
- B. General: Install engraved plastic laminate sign on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:
 1. Fans, blowers, primary balancing dampers, air blenders and mixing boxes.
- C. Locate equipment labels where accessible and visible.

3.3 DUCT LABEL INSTALLATION

- A. General: Identify air supply, return, exhaust, intake and relief ductwork with tags and arrows, showing ductwork service and direction of flow.
- B. Install plastic-laminated, self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:
 1. Blue: For supply air ducts.
 2. Red: For return air ducts.
 3. Orange: For outside air ducts
 4. Green: For exhaust-, relief-, and mixed-air ducts.
 5. ASME A13.1 Colors and Designs: For hazardous material exhaust.
- C. Location: In each space where ductwork is exposed, or concealed only by removable ceiling system, locate signs near points where ductwork originates or continues into concealed enclosures (shaft, underground or similar concealment), and at 50' spacings along exposed runs. Identification shall be applied only to new work..

END OF SECTION 230553.00

SECTION 230593.00 - TESTING, ADJUSTING AND BALANCING FOR HVAC**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

- A. Shop Drawings
 - 1. Certified Reports
 - a. Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:
 - 2. Final Report
 - a. Upon verification and approval prepare final reports, type written, and organized and formatted as specified below. Divide the contents of the report into the below listed divisions: General Information and Summary, Air Systems.
- B. Quality Assurance
 - 1. Codes and Standards
 - a. AABC: "National Standards for Total System Balance".
 - b. ASHRAE: ASHRAE Handbook, HVAC Applications, Chapter 39, Testing, Adjusting, and Balancing.
 - 2. Balancing Agency Qualifications
 - a. The owner shall procure the services of an independent Balance and Testing Agency, approved by the Engineer, and a member of Associated Air Balance Council (AABC) or NEBB, which specializes in the balancing and testing of heating, ventilating, and air conditioning systems, to balance, adjust and test all air and water systems and equipment as herein specified.
 - 3. TAB Conference Meeting Minutes
 - a. Meet with Owner's and Architect's representatives on approval of TAB strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of TAB team members, equipment manufacturers' authorized service representatives, HVAC controls installers, and other support personnel. Provide seven days' advance notice of scheduled meeting time and location.
 - b. Agenda Items: Include at least the following:
 - 1) Submittal distribution requirements.
 - 2) The Contract Documents examination report.
 - 3) TAB plan.
 - 4) Work schedule and Project-site access requirements.
 - 5) Coordination and cooperation of trades and subcontractors.
 - 6) Coordination of documentation and communication flow.
 - 4. Certification of TAB Reports
 - a. Certify TAB field data reports shall include the following:
 - 1) Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - 2) Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.
 - 5. TAB Report Forms

- a. Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems." NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems." SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing."
- C. Quality Control
 - 1. Agency Data
 - a. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications.

1.2 PROJECT CONDITIONS

- A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 GENERAL

- A. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Note the locations of devices that are not accessible for testing and balancing.
- B. Report deficiencies discovered before and during performance of the testing and balancing procedures. Observe and record system reactions to changes in conditions. Record default setpoints if different from indicated values.

3.2 PRELIMINARY PROCEDURES FOR AIR SYSTEM BALANCING

- A. Air balance and testing shall not begin until the system has been completed and is in full working order. The Contractor shall put all heating, ventilating and air conditioning systems and equipment into full operation and shall continue the operation of same during each working day of testing and balancing.

3.3 PERFORMING TESTING, ADJUSTING, AND BALANCING

- A. Cut insulation, ductwork and equipment casings for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.
 - 1. Patch insulation, ductwork, and housings, using materials identical to those removed.
 - 2. Seal ducts after testing. Test for leaks and repair if found.
 - 3. Plug and seal equipment casings after testing. Test for leaks and repair if found.
 - 4. Seal insulation to re-establish integrity of the vapor barrier.
- B. Mark equipment settings, including damper control positions, fan speed control levers, potentiometers and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.

- C. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.
- D. Balancing contractor shall include costs to resheave fans in order to achieve required airflows. A credit shall be provided to the owner if resheaving is not required.
- E. Record external static pressure on a profile schematic for each piece of HVAC equipment.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Fan(s) shall be balanced so that VFD speed at 55 hz shall be equal to design air flow to allow for an increase in flow using the VFD.
- B. Adjust fans to deliver total indicated airflows within the maximum allowable fan motor speed listed by fan manufacturer.

3.5 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 condition of filters.
 - 4. Check the condition of coils.
 - 5. 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. 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.
 - 2. Verify that the indicated airflows of the renovated work result in fan speeds that are within the acceptable limits defined by equipment manufacturer.
 - 3. Adjust fan speeds within the limits of the installed drives to achieve design airflow.
 - 4. Balance system to design airflows indicated.
- D. Renovations – Air Side:
 - 1. In areas where existing air handling equipment or exhaust fans are being utilized, balancing contractor shall include the cost to pre-check each fan airflow (supply, return, exhaust) and any branch ductwork serving existing areas, prior to demolition and provide a report outlining existing air flows prior to any work. Any discrepancies of required air flows compared to design air flows shall be brought to the attention of the engineer prior to any work.

2. At the completion of construction, balancing contractor shall re-check and adjust each air handler or exhaust fan air flows. (supply, return, exhaust) to meet the required air flows. Change out sheaves, increase static pressure set-points, change motors and ramp up fans as required to obtain design air flows. Clean existing coils, change filters as required to obtain design air flows.
3. Adjust existing ductwork dampers serving existing spaces and balance to pre-checked air flows. Air flows serving existing spaces shall be similar after project is complete.

3.6 FINAL TEST AND BALANCE REPORT

- A. The report shall be a complete record of the HVAC system performance, including conditions of operation, items outstanding, and any deviations found during the T&B process. The final report also provides a reference of actual operating conditions for the owner and/or operations personnel. All measurements and test results that appear in the reports must be made on site and dated by the AABC technicians or test and balance engineers.
- B. The final test and balance report shall be sent to the engineer of record and contractor.

3.7 REVERIFICATION

- A. T&B Agency shall recheck all measurements and make adjustments as required to complete the balancing. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second verification.

3.8 ADDITIONAL TESTS

- A. Seasonal Periods: If initial T&B procedures were not performed during near-peak conditions, the engineer of record may request a temperature recheck to further verify performance at near-peak conditions.
- B. Duct Leakage Testing:
 1. Witness the duct pressure testing performed by the mechanical/installing contractor.
 2. Verify that proper test methods are used and that leakage rates are within specified tolerances.
 3. Report any deficiencies observed.

END OF SECTION 230593.00

SECTION 230713.00 - DUCT INSULATION

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

- A. Product Data
 - 1. Provide for each type of product indicated.
 - a. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).
 - 2. Schedule.
 - a. Submit schedule showing insulation products which will be used for each application, indicating thickness, density, and accessories.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ANSI/ASTM E 84 and NFPA 255, by a testing 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 agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
- B. Installed R-Values for insulation on ducts shall comply with local mechanical and energy code as required for indoor applications.

2.2 INSULATION MATERIALS

- A. Manufacturers
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corp..
 - b. Johns Manville.
 - c. Knauf Insulation.
 - d. Owens Corning.
- B. Interior (indoor) ductwork insulation shall have a minimum installed thermal resistance value of R6 or code minimum, whichever higher.
- C. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, without facing and with vapor barrier Type II with factory-applied kraft paper, reinforcing scrim, aluminum foil and vinyl jackets.
- D. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IB. For duct and plenum applications, provide insulation

without facing and with vapor barrier with factory-applied kraft paper, reinforcing scrim, aluminum foil and vinyl jacket.

E. Vapor Barrier Material for Ductwork: Paper-backed aluminum-foil, except as otherwise indicated; strength and permeability rating equivalent to factory-applied vapor barriers on adjoining ductwork insulation, where available; with following additional construction characteristics:

1. High Puncture Resistance: Low vapor transmission (for ducts in exposed, high traffic areas susceptible to damage: Mech. Rooms, etc.)
2. Moderate Puncture Resistance: Medium vapor transmission (for ducts in concealed areas).

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Extend ductwork insulation without interruption through walls, floors and similar ductwork penetrations, except where otherwise indicated
- B. Lined Ductwork: Except as otherwise indicated, omit insulation on ductwork where internal insulation or sound absorbing linings have been installed. Duct lining thermal resistance value shall comply with external duct wrap requirements.
- C. 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. 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.

3.2 DUCT INSULATION SCHEDULE

- A. All ductwork shall be insulated except:
 1. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
 2. Factory-insulated flexible ducts.
 3. Factory-insulated plenums and casings.
 4. Flexible connectors.
 5. Vibration-control devices.
 6. Factory-insulated access panels and doors.
 7. Supply ductwork exposed in conditioned (heated and cooled) spaces.
 8. Supply ductwork in mechanical rooms, equipment rooms, plenums, server rooms and electric equipment rooms shall be insulated.
 9. Toilet exhaust, general exhaust and return ductwork in conditioned (heated and cooled) spaces within the building's thermal envelope.
- B. Ductwork penetrating building envelope
 1. Insulate all ductwork penetrations at the building envelope. Insulate all interior ductwork from the envelope penetration back to ten feet minimum. Insulate all exterior ductwork from the envelope penetration to the terminus with 2" thick elastomeric insulation with aluminum jacket.

C. Grilles, Registers, and Diffusers:

1. Provide insulation on collar and backside of supply diffusers in all ceiling spaces. Provide insulation on plenum box of all supply grilles & registers in all ceiling spaces.
2. All transfer air ducts shall be provided with acoustic lining unless otherwise noted on drawings.

3.3 PENETRATIONS

A. Insulation installation through assemblies: Provide insulation continuously through assembly penetrations.

1. For applications requiring only indoor insulation, terminate insulation beyond exterior surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
2. Seal penetrations to maintain assembly rating.

END OF SECTION 230713.00

SECTION 233113.00 - METAL DUCTS**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

- A. Product Data
 - 1. Provide for each type of product indicated.
- B. Shop Drawings
 - 1. Sheet metal thicknesses.
 - 2. Joint and seam construction and sealing.
 - 3. Reinforcement details and spacing.
 - 4. Materials, fabrication, assembly, and spacing of hangers and supports.
 - 5. Design Calculations for selecting hangers and supports.
 - 6. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 - 7. Factory- and shop-fabricated ducts and fittings.
 - 8. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
 - 9. Elevation of top of ducts.
 - 10. Dimensions of main duct runs from building grid lines.
 - 11. Fittings.
 - 12. Reinforcement and spacing.
 - 13. Seam and joint construction.
 - 14. Penetrations through fire-rated and other partitions.
 - 15. Equipment installation based on equipment being used on the project.
 - 16. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
 - 17. Hangers and supports, including methods for duct and building attachment and vibration isolation.

PART 2 - PRODUCTS**2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS**

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dixie Sheetmetal
 - b. Eastern Sheetmetal of Cincinnati
 - c. Linx Industries.
 - d. Semco Mfg., Inc.
 - e. Hranec
 - f. Corken Steel Products

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.

D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

F. Fabricated ductwork shall comply with AMCA Standard 511 for air leakage.

2.3 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials and duct construction methods unless otherwise

indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Exposed Ductwork: Provide paint grip on all exposed ductwork that is required to be painted. Refer to architectural drawings for areas where duct is to be painted. Coordinate with all trades prior to installing paint grip.
- D. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- E. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 DUCT LINER

- A. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1; and with NFPA 90A or NFPA 90B.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Aeroflex USA Inc.
 - b. Armacell LLC.
 - c. Rubatex International, LLC
 - 2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
 - 3. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
- B. Insulation Pins and Washers:
 - 1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 - 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- C. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation"

2.5 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

- B. Zero VOC: All duct sealants, fibers, tapes, etc. shall be contain no volatile organic compounds (VOC)
- C. Two-Part Tape Sealing System:
 - 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 - 2. Tape Width: 3 inches.
 - 3. Sealant: Modified styrene acrylic.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - 7. Service: Indoor and outdoor.
 - 8. Service Temperature: Minus 40 to plus 200 deg F.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
- D. Solvent-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Base: Synthetic rubber resin.
 - 3. Solvent: Toluene and heptane.
 - 4. Solids Content: Minimum 60 percent.
 - 5. Shore A Hardness: Minimum 60.
 - 6. Water resistant.
 - 7. Mold and mildew resistant.
 - 8. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
 - 9. Service: Indoor or outdoor.
 - 10. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- E. Flanged Joint Sealant: Comply with ASTM C 920.
 - 1. General: Single-component, acid-curing, silicone, elastomeric.
 - 2. Type: S.
 - 3. Grade: NS.
 - 4. Class: 25.
 - 5. Use: O.
 - 6. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- F. Round Duct Joint O-Ring Seals:
 - 1. Seal shall provide maximum 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
 - 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. For all exposed ducts downstream of VAV boxes provide 10 feet of duct liner. For round duct provide internal screen to hold liner. All balancing dampers for exposed ductwork shall be fully body, locking quadrant dampers.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

- C. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- D. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

3.2 INSTALLATION OF DUCT LINER

- A. General: Install duct liner in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-19, "Flexible Duct Liner Installation."
- B. Size of ductwork shown on the drawings is free net area, outside dimension of ducts will need to be increased if lined duct is used.
- C. The following ductwork shall be lined:
 1. Return from open ceiling plenum return to HVAC unit.
 2. Transfer Air ducts.
- D. The following ductwork shall be lined with duct liner:
 1. Return ductwork in ducted return systems 10 feet downstream of HVAC unit.
 2. Exhaust ductwork 10 feet upstream and downstream of fans.
 3. Transfer air ducts.
 4. Supply air duct 10 feet downstream of VAV box.
- E. The following ductwork shall be lined with rigid duct liner:
 1. Return from open ceiling plenum return to HVAC unit.
 2. Field or shop fabricated return air/outside air mixing plenums at HVAC units.

3.3 DUCT SEALING

- A. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
 1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 2. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
 3. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
 4. Unconditioned Space, Exhaust Ducts: Seal Class C.
 5. Unconditioned Space, Return-Air Ducts: Seal Class B.
 6. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
 7. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
 8. Conditioned Space, Exhaust Ducts: Seal Class B.
 9. Conditioned Space, Return-Air Ducts: Seal Class C.

3.4 PAINTING

- A. All ductwork required to be painted shall be cleaned and oil-free. Mechanical Contractor shall prepare ductwork surfaces accordingly to accept primer and paint.

B. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer.

3.5 FIELD QUALITY CONTROL

A. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:
 - a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections totaling no less than 25 percent of total installed duct area for each designated pressure class.
 - b. Supply Ducts with a Pressure Class of 3-Inch wg or Higher: Test representative duct sections totaling no less than 50 percent of total installed duct area for each designated pressure class.
 - c. Return Ducts with a Pressure Class of 3-Inch wg or Higher: Test representative duct sections totaling no less than 50 percent of total installed duct area for each designated pressure class.
 - d. Exhaust Ducts with a Pressure Class of 3-Inch wg or Higher: Test representative duct sections totaling no less than 50 percent of total installed duct area for each designated pressure class.
 - e. Outdoor Air Ducts with a Pressure Class of 3-Inch wg or Higher: Test representative duct sections totaling no less than 50 percent of total installed duct area for each designated pressure class.
3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Test for leaks before applying external insulation.
5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
6. Give seven days' advance notice for testing.

B. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

C. Duct system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.6 DUCT CLEANING

A. Clean new and existing duct system(s) before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated duct. Patch insulation as recommended by manufacturer.

2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts or duct accessories.
4. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
5. Provide drainage and cleanup for wash-down procedures.
6. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

END OF SECTION 233113.00

SECTION 233416.00 - CENTRIFUGAL HVAC FANS**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

- A. Product Data
 - 1. Provide for each type of product indicated.
- B. Shop Drawings
 - 1. Coordination drawings
 - a. Include plans, elevations, sections, and attachment details.
 - b. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - c. Include diagrams for power, signal, and control wiring.
 - 2. Design Calculations
 - a. Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 - 3. Vibration Isolation Base Details
 - a. Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.

PART 2 - PRODUCTS**2.1 GENERAL**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Acme Engineering & Mfg. Corp.
 - 2. Greenheck Fan Corporation.
 - 3. Loren Cook Company.
 - 4. Twin City Fan Companies.
- B. Project Altitude: Base fan-performance ratings on actual Project site elevations.
- C. The sound output from fans shall not exceed 70 dBA.
- D. Operating Limits: Classify according to AMCA 99.
- E. Prelubricated and Sealed Shaft Bearings:
 - 1. Self-aligning, pillow-block-type bearings.
 - 2. Ball-Bearing Rating Life: ABMA 9, L10 at 80,000 hours.
 - 3. Roller-Bearing Rating Life: ABMA 11, L10 at 80,000 hours.
- F. Grease-Lubricated Shaft Bearings:
 - 1. Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.
 - 2. Ball-Bearing Rating Life: ABMA 9, L10 at 80,000 hours.
 - 3. Roller-Bearing Rating Life: ABMA 11, L10 at 80,000 hours.

2.2 BACKWARD-INCLINED CENTRIFUGAL FANS

A. Description:

1. Factory-fabricated, -assembled, -tested, and -finished, direct-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor, drive assembly, and support structure.

B. Housings:

1. Formed panels to make curved-scroll housings with shaped cutoff.
2. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
3. Horizontally split, bolted-flange housing.
4. Spun inlet cone with flange.
5. Outlet flange.

C. Backward-Inclined Wheels:

1. Single-width-single-inlet and double-width-double-inlet construction with curved inlet flange, backplate, backward-inclined blades, and fastened to shaft with set screws.
2. Welded or riveted to flange and backplate; cast-iron or cast-steel hub riveted to backplate.

D. Shafts:

1. Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with adjustable alignment.
2. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.
3. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

E. Accessories:

1. Scroll Drain Connection: NPS 1 steel pipe coupling welded to low point of fan scroll.
2. Companion Flanges: Rolled flanges for duct connections of same material as housing.
3. Variable Inlet Vanes: With blades supported at both ends with two permanently lubricated bearings of same material as housing. Variable mechanism terminating in single control lever with control shaft for double-width fans.
4. Inlet Screens: Grid screen of same material as housing.
5. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
6. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.
7. Weather Cover: Enameled-steel sheet with ventilation slots, bolted to housing.

2.3 MOTORS

A. Motors with Variable frequency drives: All fan motors shall be of the highest efficiency possible, either Premium or High Efficiency rating. All fan motors with VFD's must be inverter duty rated and manufacturer shall factory inverter balance the fan motor through the entire operating range. A/C motors shall be rated for both constant and variable speed applications.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide high static pressure switch in the ductwork downstream of exhaust fans greater than 3 hp. Fan shall shutdown upon detection of static pressure in excess of 2" wc.. Provide manual reset.
- B. Equipment Mounting: Install fans on cast-in-place concrete equipment base(s) using restrained spring isolators.
 - 1. Minimum Deflection: 1 inch.
 - 2. Install dowel rods to connect 4"-high concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete floor.
 - 4. Follow manufacturer's installation instructions and provide vibration isolation to reduce sound transfer into hearing room.

END OF SECTION 233416.00

SECTION 233713.00 - DIFFUSERS, REGISTERS AND LOUVERS

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

- A. Product Data
 - 1. Provide for each type of product indicated.
 - 2. Diffuser, Register, and Grille Schedule
 - a. Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

PART 2 - PRODUCTS

2.1 DIFFUSERS AND REGISTERS DIFFUSERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Nailor Industries Inc.
 - 2. Price.
 - 3. Titus.
 - 4. Tuttle & Bailey.
- B. Ceiling diffuser back pans shall be externally insulated by the factory with a molded heavy duty foil/scrim vapor barrier with an R-value of 6. The insulation shall meet the requirements of UL 181, ASTM E84 and NFPA 90.
- C. In drywall applications provide remote damper with linkage for each diffuser for air balancing the branch duct up stream of the diffuse without the need for access panels.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- B. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.
- C. All return air devices installed opening into a plenum or ceiling space shall be provided with an internally lined 24 gauge sheet metal sound boot, per details, minimum of 24" in length.

END OF SECTION 233713.00

SECTION 260100.00 - OPERATION AND MAINTENANCE OF ELECTRICAL SYSTEMS**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

- A. Closeout
 - 1. Operation and Maintenance Manual: For equipment and systems to include in operation and maintenance manuals.
- B. Shop Drawings
 - 1. As-Built Drawings: For recording installed conditions that deviate from design documents.

1.2 OPERATION AND MAINTENANCE MANUAL

- A. The contents of operating and maintenance manual shall include the following:
 - a. Project Information Cover: Title of Project; Name and address of Owner, Design Professionals, Contractor of Record and Subcontractor; System name and specification references.
 - b. Index: Contents of the manual.
 - c. Warranty Statements: Furnish a warranty statement for each system, reiterating the terms of warranty identified within the Contract Documents, and identifying how the Owner is to obtain warranty service. Clearly identify which products are covered by Manufacturer warranties beyond the Contractor required minimum warranty period. The term of manufacturer warranty shall also be identified (e.g., 1-year parts and labor). Identify the date that the warranty for the system starts. This date shall be the date listed on the Certificate of Substantial Completion (if one was issued to the contractor specifically for the system) or the date listed on the Notice of Final Completion. Supply standard out-of-warranty service rates and service contact information.
 - d. Bill of Materials: List of products supplied, and serial numbers of each product.
 - e. Product Datasheets and Shop Drawings: Manufacturer datasheets and shop drawings for each product and system supplied.
 - f. Manufacturer Owner / User Manuals: Manufacturer's Owner's or User's manual for each product, and Manufacturer's Installation instructions and other documentation supplied with the product.
 - g. Extra Material Schedule:
 - 1) Complete spare parts schedule for components of equipment furnished, which are not factory generic information, but accurate for the equipment provided.
 - 2) Itemized list of each piece of electrical, architectural and Owner equipment having electrical connections with circuit and panelboard locations; also, list related expendable equipment required for each item, such as fuse size and type, pilot lights, catalog numbers of fuses, overloads, etc. as applicable.
 - 3) Itemized list of each luminaire type with catalog number of replacement lamps, ballasts, boards, drivers, trims, lenses, accessories, etc.
 - h. Maintenance Procedures: Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; testing, aligning and adjusting instructions.
 - i. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

- j. Function and Operating Descriptions: Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
- k. Operating Procedures: Manufacturer's printed operating procedures including start-up, break-in, normal operating instructions, regulation, control, stopping, shutdown, and emergency instructions.
- l. Include Product Certificates, Source quality-control test reports and Field Quality-Control Reports
- m. Test Reports and Checklists: Test reports, checklists, and other forms generated and completed for the Project.
- n. Training Information: Copy of training outlines/agendas, training session handouts, training sign-in sheets, and signed delivery receipt for each training session recording; Separate USB drive, labeled, for audio/video-recorded instructions to Owner, for operations and maintenance for each system.
- o. As-Built Drawings.
- p. Software: Application and operating software documentation; Software licenses; Software service agreements; Manufacturer's operating specifications; design user's guide for software and hardware; Editable configuration files for system equipment; Software source code used in supplied products; Compiled versions of configuration files and source code; IP addresses of products configured to have static IP addresses; MAC addresses of products featuring network communication ports (wired and/or wireless); Network device names for products configured for DHCP; Software required for reviewing and editing supplied files.

1.3 AS-BUILT DRAWINGS

- A. Obtain two complete sets of electrical prints and use them to provide progress record drawings which are separate, clean, prints reserved for the purpose of showing a complete picture of the work as actually installed (including routing of conduit and cables). These drawings also serve as work progress report sheets. Make notations, neat and legible thereon daily as work proceeds. Make these drawings available for inspection at all times and keep them at the job at a location designated by the Owner's Representative.
- B. Maintain the clean, undamaged set of prints of drawings as well as a set of submittal drawings and coordination drawings. Mark the sets to show the actual installation where the installation varies from the Documents as originally shown. Include locations of underground and concealed items if placed other than shown on the Documents. Where shop drawings are used, record a cross-reference at the corresponding location on the Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
- C. Show changes in: size, type, capacity, etc., of material, device or piece of equipment, location of device or piece of equipment; location of outlet or source of building service systems; routing of piping, conduit, or other building services. Record location of concealed equipment, electrical service work, conduits and other piping/work by indication of measured dimensions to each line from readily identifiable and accessible walls, column lines or corners of building. Indicate approved substitutions, modifications, and actual equipment and materials installed.
- D. Affix near the titleblock on each drawing the Contractor's Company Name(s), signature of Contractor's Representative(s) and current date.
- E. For electrical work installed below slabs, pavements, grade, etc., record location of nearby concealed water piping, sewers, wastes, vents, ducts, conduit and other piping, etc. by indication of measured dimensions to each line from readily identifiable and accessible walls or corners of building and from adjacent electrical work. Show invert elevation of underground electrical work relative to work installed by other trades.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 INSTRUCTION OF THE OWNER'S PERSONNEL

- A. Provide instruction in the proper operation and maintenance of equipment that requires routine servicing. Include the following:
 - 1. Review of operation and maintenance manuals.
 - 2. Required tools.
 - 3. Lubricants.
 - 4. Extra Materials.
 - 5. Cleaning.
 - 6. Hazards.
 - 7. Warranties and maintenance agreements.
- B. Demonstrate equipment and systems operation including the following:
 - 1. Start-up.
 - 2. Shut-down.
 - 3. Emergency conditions.
 - 4. Safety procedures.
 - 5. Setpoint and schedule adjustments.
 - 6. Economy and efficiency adjustments.

END OF SECTION 260100.00

SECTION 260501.00 - COMMON REQUIREMENTS FOR ELECTRIC**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 all sections.

1.2 GENERAL DIRECTION

- A. Submittal of a bid indicates that the contractor has examined the drawings, specifications, and had an opportunity to visit the site to be able to provide a comprehensive complete bid.
- B. The intent of these specifications and the accompanying drawings is to provide complete and workable systems as shown, specified and required by applicable codes. Interpret these specifications in conjunction with the drawings and provide all work described. If work is shown on drawings and not mentioned in the specifications, or vice versa, it is to be included in the work the same as though clearly set forth by both. Should there be a conflict between the specifications and drawings, provide the greater quantity or better quality. Immediately notify owner's representative and design professional of such conflicts.
- C. The drawings that accompany these specifications are diagrammatic and although size and location of equipment is drawn to scale wherever possible make use of submittal data and verify all dimensions on site. They do not show every conduit, offset or pull / junction box which may be required to install work in the space provided and avoid conflicts. The drawings are an outline to indicate the approximate location and arrangement of work. Follow the drawings as closely as is practical and install additional pull / junction boxes and offsets where required by site conditions and codes at no additional cost. Install all new work in such manner as to conform to the structure, avoid obstructions, provide required service clearances and preserve headroom. Do not scale from drawings, all measurements should be taken in the field.
- D. Coordinate all new work with all other contractors and installers in addition to existing building obstructions and install accordingly. Refer to coordination drawings of other trades. Comply with requirements of architectural drawings including but not limited to mounting height and locations.
- E. Provide all labor and material, tools and equipment necessary to render all systems complete and operational, and ready for turnover to Owner. Work defined within this section applies for all Division 26 work, including work of Division 26 that is provided in support of work of other divisions. Unless specifically indicated otherwise in documents of other construction divisions, products to be installed shall also be furnished under Division 26.
- F. Fully research peculiarities and limitations of space available for installation of work with materials being provided. Work around material lead times to not extend project schedule.
- G. Branch circuiting shown on drawings is also diagrammatic not intended to be the installation location. For instance, circuiting shown on the exterior of the building connecting building mounted items shall be installed indoors concealed wherever possible. For circuits remote from the building, provide the work below grade unless otherwise indicated.

- H. Complete work, or part(s) thereof, at times as may be designated by the Owner's Representative, so that it can be used for temporary or permanent use. Do not construe such use of the system as an acceptance of it by Owner.
- I. During mobilization or construction, if an abnormal condition is uncovered either with existing conditions, equipment loads, submittal data, etc. bring these to the attention of the Design Professional for review.
- J. Owner's Representative or Design Professional may relocate fixtures, devices, equipment, etc. prior to installation within a 20-foot limit at no additional charge.

1.3 GENERAL STANDARDS

- A. Provide work in compliance with applicable provisions of the following standards. Provide listing and labeling for all electrical materials, marked for respective intended uses, from UL or other Nationally Recognized Testing Laboratory (NRTL) that is acceptable to applicable Authorities Having Jurisdiction (AHJs).
- B. Provide materials, installation methods, workmanship, testing, etc., in strict accordance with the latest adopted edition of applicable standards and adopted codes, including (but not limited to) the following.
 - 1. International Building Code
 - 2. State Building Code and applicable amendments
 - 3. State Energy Code
 - 4. Utility company requirements and standards as applicable
 - 5. All provisions and requirements of NFPA (National Fire Protection Association)
 - 6. National Electrical Code (NEC), NFPA 70
 - 7. Life Safety Code, NFPA 101
 - 8. Local governmental and other prevailing codes and ordinances
 - 9. ADA/ADAAG requirements (American with Disabilities Act) including all applicable Standards for Accessible Design.
 - 10. UL (Underwriters Laboratories Inc.)
 - 11. ETL (Intertek Testing Services NA, Inc.)
 - 12. CSA (CSA Group Testing and Certification Inc.)
 - 13. FM (Factory Mutual Insurance Company)
 - 14. ASME (American Society of Mechanical Engineers)
 - 15. NEMA (National Electrical Manufacturers Association)
 - 16. NECA (National Electrical Contractors Association)
 - 17. IP (International Protection Rating / Ingress Protection Rating)

1.4 PERMITS AND REGULATIONS

- A. Obtain and pay for permits, fees, certificates of inspection and approval, etc. required for this branch of the work. Furnish Owner with certificates of final inspection and approval prior to final acceptance of this branch of the work.
- B. Laws and regulations which bear upon or affect the various branches of this work shall be complied with by this contractor and are hereby made a part of this contract.

1.5 DEFINITIONS

- A. Furnish - Procure, supply and deliver to project site, ready for installation, install and warrant (unless indicated otherwise on documents). Include warranty expenses.
- B. Install - Assemble, wire and connect loose-shipped components on site. Place in position for service or use, including material, labor, accessories, services, and testing. Wire, connect, and render fully operational for intended use.
- C. Provide - Furnish and Install. Similar Terms: "include", "shall", "equip with", "consisting of"
- D. Equal or Equivalent - Determination of equivalency to be made by design professional for all products not listed as basis-of-design.
- E. Substantial Completion - Where frontend documentation does not define, products and systems must be fully installed as designed, tested, adjusted, labeled, and functionally demonstrated to owner.
- F. NRTL: Nationally Recognized Testing Laboratory
- G. OCPD: Overcurrent protective device.
- H. SCCR: Short-circuit current rating.

1.6 REQUESTS FOR INFORMATION

- A. Submit all questions, requests for information (RFIs) and similar queries through the formally-established RFI process for the project that has been accepted by the Owner's Representative, Design Professionals, Prime Contractor and subcontractors. Submit as a PDF file. Do not submit as text in an email.

1.7 AVAILABILITY OF ELECTRONIC DRAWINGS

- A. If expressly permitted by the Owner and the terms of the Contract, editable electronic drawings may be made available for the creation of shop and as-built drawings upon request. Drawings will be made available at the discretion of the Engineer.
- B. "Request Drawings" form can be accessed, filled out and submitted at <http://www.klhengrs.com> (right hand side of page - Contractor Resources). Direct access to this form can be found here: <https://apps.klhengrs.com/drawingrequests>

1.8 QUALITY ASSURANCE

- A. Contractor shall have a minimum five (5) years experience in the installation of systems similar to the systems specified. Contractor if requested shall demonstrate his ability to perform all work to be included under the contract. Assurance if requested, shall be in the form of a list of past projects of similar size and complexity and a list of six (6) references pertaining to those projects. Failure to demonstrate these quality assurances shall be taken as a statement of the contractor's inability to perform.
- B. Contractor and all workers trained in electrical safety as required by NFPA 70E.

1.9 WARRANTY / GUARANTEE

- A. Provide a warranty/guarantee in written form as part of O&M manual stating that all work, materials, equipment and parts are warranted to be free of defect for a minimum period of one year from the date of Substantial Completion. Warranty period and requirements may be expanded in drawings or subsequent specification sections. Repair or replace (owner's option) any defects or failures at no cost to the owner within the warranty period. Issues arising within warranty period must be attended to in a timely manner and in no case exceed four (4) working days. State this in writing as part of O&M manual. Replace defective items to the satisfaction of the Owner's Representative and the Design Professional.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Provide materials that are new, full weight, of the best quality. Provide similar materials that are of the same type and manufacturer. Provide materials, apparatus and equipment with NRTL listing and label where regularly supplied. Provide only products that are intended for, rated for and suitable for the installed condition.
- B. Provide basis of design products or listed products equivalent in quality, performance, aesthetics, and product support (factory and local) to that specified as basis of design. Products not basis of design are subject to review by the Design Professional and possible rejection. Listing of a product manufacturer by name alone as an equivalent manufacturer shall not equate all products offered by that manufacturer to the basis of design.
- C. Bear all costs incurred from deviation from basis-of-design materials, methods, labor, services, etc. Use of materials, methods, labor, services, etc. that deviate from the basis-of-design will be considered a statement that capacities, requirements, clearances, arrangements, performance, etc. have been checked, verified, found satisfactory, and align with intent of specified work and applicable codes and regulations.
- D. Should deviation from basis of design equipment impact other contractors scope of work it shall be the responsibility of this contractor to coordinate with and cover these costs in addition to their own.

PART 3 - EXECUTION

3.1 GENERAL DIRECTION

- A. Unless specifically indicated, provide all specified and drawn work as required to render all equipment and systems fully operational, including all ancillary, accessory, and support work.
- B. Install equipment and materials in strict accordance with manufacturer's written instructions. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque values.
- C. In cases where products / materials are furnished by Owner or others, provide the following services: receive, transport and securely store materials on site; remove materials and components from packaging; assemble all materials and components per factory instructions; install, wire and connect materials and components as recommended by manufacturer for a fully operational installation.

- D. Wire and connect electrical equipment furnished under this branch of work, other branches of work and by the Owner. Review documents of other trades to identify electrically operated/controlled equipment that is furnished or installed by the Owner, or by other trades. Provide power connections and local disconnects for same. Provide control wiring (including relays, starters, programming, etc.), as required to render equipment fully operable.
- E. Except where otherwise indicated, provide fully-rated or series-rated overcurrent protection (OCP). Provide equipment and OCP rated to meet or exceed the calculated available series-rated fault current at the respective node in the power distribution system. Series-rated breakers/systems are not permitted where prohibited by prevailing codes and standards, including applications involving motor contribution as addressed in Article 240.86(C) of NFPA 70.
- F. Remove and replace items that may impede new work installation including but not limited to fencing, doors, gypsum, lift-out panels, and structures to provide pathway for moving equipment into place.
- G. Examine surfaces to receive products for suitable mounting conditions and verify compliance with installation tolerances and other conditions affecting performance of the work. Proceed with installation only after unsatisfactory conditions have been corrected.
- H. Drawings indicate dimensions for typical equipment configurations including clearances between equipment and adjacent surfaces and other items. Ensure selected products and equals comply with layout provided and required clearances.

3.2 SUPERVISION AND WORKMANSHIP

- A. Workmanship throughout shall conform to the standards of best practice and all labor employed must be competent and qualified to do all the work required.
- B. Furnish the services of an experienced superintendent to be in constant charge of the work at all times.
- C. Provisions shall be made for owner's representative or design professional to make rough-in and open ceiling inspections prior to covering up work.

3.3 CHANGE OF WORK

- A. In the event of revised scope or work formally issued through Change of Work order, contractor shall provide an itemized breakdown of pricing and receive approval prior to commencing with work.

3.4 COORDINATION

- A. Commence with coordination in a timely manner. Subsequent additional compensation, special allowances, additional construction time, etc. will not result from failure to coordinate (including providing related information to other trades for review) in a timely manner. Do not plan, fabricate or install work before consulting with and properly coordinating with other trades so that work will not interfere with that of other trades.

- B. Coordinate layout and installation of equipment and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces.
- C. Participate in multi-trade coordination efforts prior to commencing with material procurement or installations. Provide electrical coordination drawings, and participate in preparation of coordination drawings by other trades, prior to fabrication or installation of equipment, materials, etc. Coordinate actual clearances of installed equipment. Coordinate exact location of electrical outlets, lighting fixtures, conduits, raceways, equipment, cable assemblies, applicable devices, etc. well in advance of installation so there will be no interferences at installation between the various trades.
- D. Ensure that required workspace clearances, required clearances for access and maintenance and electrical working clearances of all devices and equipment complies with NEC (NFPA 70) Article 110. This also applies to finalizing locations of disconnects, starters, contactors and other electrically operated equipment that may require testing or maintenance while energized. Layout all affected equipment on paper, and meet with electrical inspector on-site as needed, prior to ordering related materials or commencing with installations, to ensure compliance with NEC Article 110.
- E. Coordinate and correct conflicts in equipment and materials prior to installation. If a conflict cannot be resolved, refer the matter to the Owner's Representative for a final decision as to method and material.

3.5 ARCHITECTURAL COORDINATION ITEMS

- A. Cutting and Patching:
 - 1. Hold cutting and patching to a minimum by arranging with other trades for sleeves and openings before construction is started.
 - 2. Cut and drill all openings in roofs, walls, and floors required to perform the work. Neatly patch all openings cut. Hold cutting and patching to a minimum by arranging with other contractors for all sleeves and openings before construction is started. When drilling / cutting concrete slabs, utilize ground penetrating radar (GPR) and/or X-ray scanning equipment to verify the location is free from obstruction, including but not limited to: structural rebar / strands / tendons and electrical conduit / wiring. Repair all damage to structural elements that may occur. Provide temporary partitions, dust barriers, vacuums to keep all dust to a minimum. Allow inspection by owner's rep and inspection by authority having jurisdiction prior to concealing any work or uncover and restore work to allow for observation.
- B. Fire Caulking:
 - 1. Fire stopping requirements/locations are not indicated on electrical drawings. Review architectural and other drawings to determine where there will be fire/smoke rated walls, floors, membranes, etc. and rating requirements of same. Provide required fire stopping work associated with electrically related penetrations. Patching through fire rated walls and enclosures shall not diminish the rating of wall or enclosure. Patch shall be equal to rockwool, firestop, caulk or approved "rated" patch / sealant / pillow / grommet / compound / etc. Clean affected surfaces, joints, etc. immediately before applying fire stopping and only apply under recommended temperature and humidity. Apply primer as required by manufacturer. Properly tool sealants for clean look. Subject to compliance with requirements, provide products by one of the following:
 - a. Fire Stop Pillows: Nelson PLW, STI, Hilti, 3M
 - b. Fire Stop Putty: Nelson FSP, STI, Hilti, 3M
 - c. Latex Intumescent Sealant: Nelson LBS3, STI, Hilti, 3M
 - d. Outlet boxes: Nelson FSP, STI, Hilti, 3M

C. Access Panels:

1. Provide all access panels required for proper servicing of equipment or access to junction boxes as a last resort after first searching out locations for equipment and junction boxes in accessible areas. All access panel locations and sizes must be coordinated with and approved by design team and owner's representative. Provide fire rated and smoke rated access panels where required. Provide frame as required for finish. Coordinate installation with General Contractor as they may elect to install access panel. Exact location(s) must be approved by the Architect. Minimum size to be 12" x 12" for junction boxes and 22" x 22" for equipment, units to be 16-gauge steel, primed for paint, door opens beyond 90 degrees and locking device shall be screwdriver cam locks.
2. For equipment or junction boxes above gypsum board or "hard ceilings", provide equipment access panels sized to permit complete holistic removal of the unit in its entirety. Access panel shall also be sized to accommodate removal of the largest piece of equipment in the case where such access panel is used as a removal pathway for multiple pieces of equipment. Subject to compliance with requirements, provide products by one of the following:
 - a. Bar-Co., Inc.
 - b. J.L. Industries.
 - c. Karp Associates, Inc.
 - d. Milcor Div. Inryco, Inc.
 - e. Nystrom, Inc.

D. Conduit Sleeves:

1. Aboveground, exterior wall penetrations: rigid steel pipe sleeve.
2. Below grade, exterior wall and floor penetrations: schedule 40 cast iron pipe sleeve
3. PVC Pipe Sleeves where allowed: ASTM D 1785, Gray, Schedule 40.
4. Rectangular opening sleeves: Galvanized Sheet Steel, thickness min 0.1 inches.
5. Sleeve Seal Systems: Provide modular sealing device designed for field assembly, EPDM, Nitrile or Silicone based on installation environment with stainless steel bolts and polymer pressure plates. Install type and number recommended by manufacturer for a water tight seal. Provide by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. CALPICO, Inc.
 - c. Metraflex Company (The).
 - d. Pipeline Seal and Insulator, Inc.
 - e. Proco Products, Inc.
 - f. OZ/Gedney
 - g. Link-Seal
6. Sleeve Seal Fittings: Provide manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Install in wall or slab as constructed and grout area around fitting. Provide by one of the following:
 - a. Presealed Systems
 - b. Bio FireShied
 - c. MetaCaulk
7. Sleeves shall be cut flush with both faces of wall. Deburr all sleeves. Floor sleeves shall extend one inch above floor top elevation. Maintain all fire ratings. Use joint compound for around gypsum sleeves. Roof penetrations shall be with flexible boot-type flashing unit or within a pipe curb assembly equal to Pate Co. Curb and flashing per roofing manufacturer's requirements to maintain warranty.

E. Grout:

1. Provide non-shrink grout, recommended for sealing openings in non-fire-rated walls or floors, ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout. Provide 5000-psi strength design mix, premixed and factory packaged.

F. Silicone Sealants:

1. Provide single-component, silicone-based, neutral-curing elastomeric sealant for exterior work. Provide pourable (self-leveling) grade formulation for openings in non-fire rated floors and other horizontal surfaces. Install only in temperature and humidity as recommended by manufacturer. Colors of all visible sealants to be clear or color approved by owner's rep or design team.

G. Acrylic Sealants:

1. Provide one-part, non-sag, mildew-resistant, paintable recommended for exposed applications of interior and protected exterior locations

3.6 PROTECTION OF SURFACES

- A. Make every effort to protect roofs, walls and floors from foot traffic, equipment, carts, lifts, etc. Make roof penetrations and install insulated roof curbs and flashing in accordance with roofing manufacturer's recommendations. Obtain written certification from roofing manufacturer that work has been performed properly and that roof warranty is intact.

3.7 UTILITY VERIFICATION REQUIREMENTS

- A. Field verify locations of underground and aboveground utilities, or those otherwise obscured from view, in the vicinity of work prior to commencing work. Utilize "811" call before you dig and hire locating service to identify, locate and mark remaining utilities and private lines. Obtain on-site approval from local utility prior to connecting services. Failure to perform the above shall result in contractor proceeding at their risk and accepting full responsibility for incorrect connections.

3.8 DELIVERY, STORAGE, HANDLING, AND PROTECTION

- A. Receive, inspect, store and protect all materials required for new work. Do not accept or install any product damaged in any way.
- B. Comply with all manufacturer guidelines and requirements for movement, storage, and protection of new work. All new work must be stored in a clean, dry place protected from weather and construction traffic. Maintain acceptable temperature and humidity per manufacturer recommendations. When stored inside or during transport through building, do not exceed structural capacity of the floor.
- C. Coordinate and account for sizes of all new work included shipping materials with available openings. Account for rigging of all new work as required and as intended by manufacturer.
- D. Do not install work until work area is sufficiently weathertight, all wet work in area is complete and all work above is complete. Provide temporary heating, cooling or humidity control to maintain acceptable conditions for install per manufacturer recommendations until permanent equipment operational.
- E. Prior to installation, all products shall have the ability to be returned to the supplier or manufacturer after purchase and charged a reasonable restocking fee equal to a small portion of the cost.

- F. Protect all new work through construction from damage. Take safeguards necessary to protect from damage. Items damaged during construction will not be accepted and shall be replaced with new.
- G. Remove and replace all materials that have been installed improperly, physically damaged, moisture or water damaged, or mold damaged.
- H. Fully remove all packaging materials inside and out prior to startup.

3.9 INTERRUPTION OF SERVICES

- A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others without notification to Owner's Representative and written permission. Arrange for and provide temporary electric service meeting requirements of owner. Notify Owner's Representative no fewer than fourteen days in advance of proposed interruption of electric service.

3.10 STARTUP, TESTING AND ADJUSTMENTS

- A. Engage a factory-authorized service representative to perform startup service. Perform tests and inspections and prepare reports for submission. Take corrective action for all non-conforming tests.
- B. Prior to energizing, test wires and cables for proper phase to phase connections, electrical continuity and short-circuits. Properly reference and resistance test grounding electrode and equipment grounding conductors. Test service voltage and configuration and take corrective action if necessary. Verify circuit voltage at source prior to energizing any feeder or branch circuit. Energize circuitry and demonstrate capability and compliance with requirements. Ensure the direction of rotation of each motor. Adjust controls, remote monitoring, safeties, operations, moving parts, etc. as applicable. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting. Complete installation and startup checks according to manufacturer's written instructions.
- C. Set and document final settings of field-adjustable circuit-breaker overcurrent trip values.

3.11 CLEANING EQUIPMENT AND PREMISES

- A. Vacuum, clean and wipe down all new work and equipment inside and out. Exposed parts which are to be painted shall be cleaned of all foreign objects and prepped for paint.
- B. During the progress of work, clean up and leave the premises and portions of the building in which work has occurred in a clean and safe condition. Provide this cleaning on a per-shift basis.

3.12 DEMONSTRATION / TRAINING

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

3.13 PROGRAMMABLE AND SOFTWARE OPERATED EQUIPMENT

- A. This subsection applies for systems that incorporate microprocessor based equipment and components. The systems themselves are specified elsewhere within Project Manual.
 - 1. Program software and equipment specifically for phased turnover of spaces based on construction phases. Program, check, and test each system using respective certified factory technician.
 - 2. Room names and numbers may change from architectural drawing names and numbers to actual operational room names and numbers. Contact Design Professionals and Owner to determine actual operating room names, room numbers, etc. and program using actual operational information. Provide interim and permanent programming and configuration work as required to render and maintain systems in full operation.
 - 3. Provide and adapt as necessary the latest release of system software and provide upgrade(s) at final close-out of project.
 - 4. All programming shall be commented in detail and turned over to owner in hard copy printed form and in electronic form on USB drive. This information shall be provided with Operations & Maintenance Manual submission.
 - 5. Existing Systems: Become familiar with existing characteristics, devices, equipment, cabling, configuration, components and programming of affected systems so that expansions, extensions, and retrofits are fully compatible with the existing conditions. Verify that systems are in proper working order prior to beginning work on an existing system. If not, bring defects to the attention of the Owner's Representative. If no notification occurs, it is assumed that the system was in working order. Provide remedial work for subsequent system problems that occur, if any.

END OF SECTION 260501.00

SECTION 260502.00 - COMMON ELECTRIC MATERIALS AND METHODS**PART 1 - GENERAL****1.1 GENERAL**

A. Mounting Heights: Outlet mounting heights as indicated on the plans are approximate. Determine the exact mounting heights (and locations) of outlets in the field with relation to architectural detail and equipment being served. Coordinate outlet location with equipment, with furniture plans and with architectural elevation plans. Where mounting heights are not detailed or dimensioned, contact the Owner's Representative for direction. Prior to rough-in, coordinate final mounting heights of system outlet boxes in field with Owner's Representative. Install boxes at heights as follows, to center of box, unless directed otherwise in field or otherwise noted on E-series drawings or architectural plans. In cases where using center of box for measurement would result in a switch-height device having an operable component higher than 48 inches above finished floor, install boxes lower as needed so that uppermost part of operable component is no higher than 48 inches. Height of boxes dimensioned from ceiling apply to rooms having ceilings 9' or less; in rooms having higher ceilings, locate these as directed in the field.

Switches – Counters: 44" (field verify & match recept. heights)
Switches – Elsewhere: 46"
Occupancy Sensors, Wallbox: 46"
Occupancy Sensors, Elsewhere: As recommended by manufacturer
Receptacles – Counters: 44" (field-verify)
Receptacles – Elsewhere: 18"
Starters: 46"
Disconnects: 46"
Circuit Breaker Panelboards: 72" to top unless code dictates otherwise
Wall Mounted Luminaires: As noted on plans or directed by Design Prof.
Control Stations: 46"
Communication Outlets: 18"
Telephone Outlets - Desk Phone: 18"
Telephone Outlets - Wall Phone: 46"
Data Outlets: 18"
RF (TV) Outlets - Wall/Ceiling: As indicated on drawings
RF (TV) Outlets – Elsewhere: 18"
Proximity/Card Readers & Keypads: 46"
Other Outlets/Fixtures/Equipment: As directed by Design Professional

B. Lock-Out Tag-Out Devices: Provide permanently installed lock-out tag-out devices compliant with NFPA 70 and OSHA, with padlocking provisions, at source overcurrent devices for the following applications.

1. Where the normal NFPA 70-compliant location of the disconnecting means is impracticable or introduces additional or increased hazards to persons or property.
2. Where required by NFPA 70.
3. Where required by OSHA.
4. Where required by any other authority having jurisdiction.

C. Electrical Installations:

1. Install conduit, wiring, outlet box and junction box type work in finished areas concealed. Such work installed in unfinished areas may be exposed only at the discretion of the Owner's Representative.

2. All new electrically related work shall be supported directly from building structural members. New electrically related work shall not be supported from ductwork, ductwork hangers, ceiling supports, existing conduit supports, etc. All conduits (and cable assemblies, where applicable) shall be routed parallel to building structural members. Noncompliant work installed by the electrical contractor shall be removed and reinstalled to the satisfaction of the Owner's Representative and the Design Professionals, at the expense of the electrical contractor.
3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work.
4. Provide systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and architectural/structural components. Provide factory-furnished filler plates in unused spaces of manufactured equipment.
5. Install electrical equipment to facilitate servicing, maintenance, and repair and replacement of equipment components. Install equipment for ease of disconnecting, with minimum of interference with other installations. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope. Protect the structure, furnishings, finishes, and adjacent materials.
6. Verify dimensions by field measurements. Take measurements and be responsible for exact size and locations of openings required for the installation of work. Where detailed method of installation is not indicated or where variations exist between described work and approved practice, follow direction of the Owner's Representative.
7. Provide no wire size smaller than No. 12 for branch circuits unless otherwise noted on plans for control circuits, or otherwise indicated in a Division 26 specification section. Provide larger sizes where required by prevailing codes or indicated on contract documents. Provide neutral conductor for all multi-pole feeders. Provide grounded ("neutral") conductor(s) for all multi-pole feeders and branch circuits unless this contractor determines in field that the affected load(s) will never have need for a neutral conductor and NEC does not mandate otherwise. Provide minimum 3/4" conduit size.
8. Do not install device wall outlets directly back to back, where located on opposite sides of common walls. Offset outlets by at least two feet for applications in fire rated walls and smoke rated walls and applications in acoustically treated walls. Offset outlets by at least one foot for other applications.
9. Provide wires continuous from outlet to outlet and properly splice joints. Provide insulation value for joints 100% greater than that of the wire. Mechanical wire splicers may be used. Where friction and rubber tape is used, provide tape conforming to Federal Specifications HH-T-11 and HH-T-111. Where plastic electrical tape is used, provide Scotch #33, or approved equal. Provide minimum 8" tail for conductors terminating at each wired outlet at their outlet fittings to facilitate installment of devices, luminaires, etc.
10. Use of synthetic or plastic "tie-wraps", "zip ties", "wire ties" and similar products are not permitted as a permanent means of anchoring, securing, supporting or otherwise installing any cables, conductors, conduits, raceways, devices, equipment or other electrical work.
11. If during construction it becomes apparent that some specific minor changes in layout will result in a neater job or better arrangement, make such alterations without additional compensation and without having to offer credit. Obtain Design Professional's review before making such changes. Provide workmanship throughout that conforms to the standards of best practice. Marks, dents and finish scratches are prohibited on exposed materials, luminaires, fittings, etc. Clean inside of panels and equipment boxes.
12. Special Occupancies: Provide all electrical work in Special Occupancies as defined and described in Chapter 5 of NFPA 70 in strict compliance with Chapter 5 of NFPA 70, in addition to compliance with specified and drawn requirements of Division 26.

D. Connectors and Connections:

1. Provide complete assembly of materials for each type of required electrical connection, including but not limited to, pressure connectors, terminals (lugs), electrical insulating tape, heat-shrinkable insulating tubing, solderless wire-nuts, and other items and accessories as needed to complete splices and terminations of types indicated.
2. Unless otherwise indicated, provide wires/cables (conductors) for electrical connections that match, including sizes and ratings, of wires/cables that are supplying electrical power. Provide electrical connectors and terminals that mate and match, including sizes and ratings, with equipment terminals, and that are recommended by equipment manufacturer for intended applications. Provide connectors that are specifically UL listed and labeled for the exact splicing/termination application, including for instances where solid conductors are spliced/connected to stranded conductors. Provide electrical insulating tape, heat-shrinkable insulating tubing and boots, wirenuts, cable ties, etc. as recommended for use by accessories manufacturers for intended applications.
3. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams. Mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment. Cover splices with electrical insulating material to achieve insulation at least 100 percent in excess of electrical insulation rating of those conductors being spliced. Prepare cables and wires, by cutting and stripping covering armor, jacket, and insulation properly to ensure uniform and neat appearance where cables and wires are terminated. Exercise care to avoid cutting through tapes which will remain on conductors. Do not "ring" copper conductors while skinning wire.
4. Ground metal frames of portable and stationary direct-wired electrically operated equipment by connecting frames to the circuit equipment grounding conductor and to grounded metal raceway. Provide necessary electrical connections between the specified equipment and junction boxes, disconnect switches, and starters near equipment with flexible metallic conduit and matched connectors. Do not expose flexible conduit in finished areas.
5. Wire and connect electrical equipment furnished under this branch of work, other branches of work and by the Owner. Review documents of other trades to identify electrically operated/controlled equipment that is furnished or installed by the Owner, or by other trades. Provide power connections and local disconnects for same. Provide control wiring (including relays, starters, etc.), as required to render equipment fully operable unless indicated otherwise on drawings or in project manual. Determine exact requirements in field from respective equipment installer.

PART 2 - PRODUCTS (INCLUDED IN PART 1 ABOVE AS APPLICABLE)**PART 3 - EXECUTION (INCLUDED IN PART 1 ABOVE AS APPLICABLE)****END OF SECTION 260502.00**

SECTION 260503.00 - SUBMITTALS FOR ELECTRICAL SYSTEMS**PART 1 - GENERAL****1.1 GENERAL**

- A. The contractor is not relieved of responsibility for providing specified or drawn scope of work should any errors or omissions in submittal information not be noted by the Design Professional during submittal reviews or site observations.
- B. Submittal requirements of this section apply to all Division 26 sections. Note that some Division 26 sections may also have additional requirements that are unique to the specific section, which would be requirements in addition to those stated in this section. Furnish submittals for each Section that includes one or more of the following elements of work: supply, installation, integration, programming, creation, labeling, and/or contractor-based design or engineering, of one or more products or systems. If a manufacturer is proposed but not listed in a particular specification section, submit as a substitute.
- C. Furnish submittals in electronic (PDF) format. Provide electronic submittal files that are compatible for opening and viewing with electronic PDF file readers that fully support and recognize the Adobe PDF Portable Document Format Standard. Assemble single PDF file submittals from a series of individual files that are organized, indexed, bound together as one composite file that is bookmarked if needed to aid the reviewer in navigating the content. The file name used to label the submittal shall be the section number followed by the submittal instance number for that Section (e.g., 260519-PD-01.pdf).
- D. "Request Drawings" form can be accessed, filled out and submitted at <http://www.klhengrs.com> (Bottom of page – Contractor Resources). Direct access to this form can be found here: <https://apps.klhengrs.com/drawingrequests>

PART 2 - PRODUCTS (NOT USED)**PART 3 - EXECUTION****3.1 GENERAL**

- A. Route submittals through established Project channels as identified by the Owner's Representative. Coordinate, assemble, title, transmit and track Project submittals. Label each submittal of each type similarly for consistency and so they appear as if prepared by the same entity. Like-type submittals (e.g., Product Data) from different Sections shall have the same appearance and organization as those of other Sections. Submittal items listed in this Section represent the common items required to be supplied for the various specification Sections throughout the duration of the Project. Individual Sections may include additional requirements. Design Professional reserves the right to require additional submittals or to waive select submittal requirements on a Section-by-Section basis.
- B. Furnish submittals for all materials proposed for use for the project, using products compliant with all respective specifications and with information shown on drawings. Furnish submittals for different Sections each with its own transmittal form. A single transmittal shall not be used to

identify submittals for more than one (1) Section at a time. Organize submittals as identified in the Contract Documents. Supply separate submittals for each Section. Do not combine multiple Sections together into a single submittal, except where expressly directed within the Contract Documents. The format for labeling the submittals shall be as follows: Section Number—Submittal Type Abbreviation—Submittal Iteration (examples: First Product Data Submittal for Section 260519: "260519-PD-00"; revised Product Data Submittal for Section 260519: "260519-PD-01.").

3.2 SUBMITTAL REQUIREMENTS

- A. General:
 - 1. Transmittal: Supply a dedicated transmittal for submittals for each individual Section. Itemize the specific submittals included by Section, submittal type, and iteration.
 - 2. Title Sheet: Include a separate title sheet (including index) with each submittal, of each type. Title sheets for each Section, for each submittal type, shall have the same appearance, 8-1/2 inches x 11 inches for product data submittals. Title sheets for drawings shall be the same size as the associated drawings. Create title sheets with appearance and information identified on the sample title sheet at the end of this Section.
 - 3. Title Blocks: Create drawing submittals on the Contractor's, manufacturers, or vendor's own title block, not using those of the Owner, Design Professionals or their Consultants.
 - 4. Legend: Drawing submittals shall include a legend of symbology.
 - 5. Resubmittals: Resubmittals shall include a replica of the reviewer's comments that necessitated the resubmittal, along with an accompanying item-by-item explanation of the actions taken and changes that will be found within the resubmittal.
 - 6. Submittal requirements indicated in this section apply for all specification sections with products and materials, and are supplemental to and in addition to submittal requirements that may be included in product and material specification sections.
- B. Informational Submittals – Submit this information as part of the Operations and Maintenance Manual.
 - 1. Product Certificates: For each applicable product or system, from manufacturer.
 - 2. Source quality-control test reports.
 - 3. Field Quality-Control Reports:
 - a. Test procedures used.
 - b. Test results that comply with requirements.
 - c. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- C. Quality Assurance Submittals (QA):
 - 1. Furnish upon request when not expressly requested to be supplied with bid. When requested, furnish to the Design Professional within 2 business days.
 - a. Qualification Data for testing agencies, including detailing of scope of services for the project.
 - b. Furnish list of Subcontractors to be used on the Project along with a description of the role each shall play on the Project, and the last six (6) projects that the Contractor (and each proposed Subcontractor) has completed that are of similar scope, size and contract value.
- D. Product Data Submittals (PD): Submit following contract award or notice of intent to award a contract. Submit and obtain review(s) prior to procurement or fabrication of materials. Provide separate manufacturer datasheets for each product, which shall be manufacturer originals of the manufacturer's official electronic datasheet. Distributor modified, distributor branded, and/or html based "web" datasheets are not acceptable. For all materials, equipment, components and ancillary materials, include the following as applicable: voltage; phase; frequency; short circuit ratings; load; dimensions; technical data; enclosure types; required clearances; weights;

methods of field assembly and installations; diagrams; configurations; capacities; finishes; construction; overcurrent protection; features; performance; electrical characteristics ratings; finishes; accessories; NRTL listing for series rated devices; time-current coordination curves for each type and rating of overcurrent protective device, including selectable ranges for each; all pertinent technical support data; factory settings; etc. Where manufacturer's datasheets depict multiple products, versions and options, indicate via highlighting, underlining, or bold visible arrows the models, versions, colors, options, etc. being supplied. Indicate and identify exact catalog numbers. Comply with applicable standards of UL or NRTL.

- E. Shop Drawing Submittals (SD): Submit following contract award or notice of intent to award a contract. Submit and obtain review(s) prior to procurement or fabrication of materials. Submit concurrently with section-specific product data submittals where both apply. Draw plans, elevations, sections, elevations and sizes to scale. Show and details, features, characteristics, ratings, factory settings, nameplates, legends, bus structure, capacities, features, accessories, locations of pertinent items, schematics, wiring diagrams, production drawings, etc. Furnish schematic drawings with all information required to install, identify, connect, wire, program, maintain, etc. the system(s). Comply with applicable standards of NRTL.
- F. Sample Submittals (SS): Submit concurrent with, or soon after, product data and shop drawings and prior to installation of Work. Furnish physical samples where applicable, in quantities as directed by Owner's Representative.
- G. Training Submittals (TG): Submit thirty (30) days prior to the first training session. Furnish proposed schedule, training agendas for each session, identification of personnel that will conduct training, and handouts proposed for distribution during training. Record all training sessions and include within O&M Manual.
- H. Closeout Submittals (CO):
 - 1. Submit following completion of onsite work.
 - 2. Operation and Maintenance Manuals:
 - a. Provide on USB drive(s). Provide sub-directories on the drive(s) to label and separate contents for the manual.
 - 3. As-Built Drawings
 - a. Provide on USB drive(s).
- I. Extra Materials: Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Generate report indicating all maintenance materials turned over to owner and obtain signature from owner acknowledging receipt.

3.3 SUBMITTAL RESPONSES

- A. Revise and Resubmit: When a submittal is marked "Revise and Resubmit," the entire submittal shall be reviewed, revised and resubmitted in totality unless specifically indicated otherwise. Resubmittals shall be checked for compliance with the Contract Documents, inclusive of requirements for submittals. In addition, any comments and deficiencies identified by the reviewer shall be appropriately acted upon. Uniquely identify specific portions of each resubmittal that have been modified since the previous version was reviewed. Resubmittals shall include a copy of the reviewer's previous comments, include a written description of the action(s) taken, be labeled chronologically, and be inclusive of all corrective action identified by the previous reviewer.
- B. Exceptions Noted: When a submittal is marked "Exceptions Noted," the specific actions identified shall be taken. No further submittal actions required

C. No Exceptions: When a submittal is marked "No Exceptions", no further actions are required.

END OF SECTION 260503.00

SUBMITTAL TITLE SHEET
EXAMPLE
(Form: Sub-1)

BID DOCUMENTS
DECEMBER 2025

PROJECT TITLE:
Project Name Line 1
Project Name Line 2
Project Name Line 2

SUBMITTAL TYPE:
Product Data

SECTION SUBMITTAL NUMBER
260519-PD-00

SECTION TITLE:
Section Name

Date Prepared:
yyyy-mm-dd

CONTRACTOR OF RECORD:
Firm Name
Address1
Address 2
City, State, Zip
Phone (000) 000-0000, Fax (000) 000-0000
Project Manager: Full Name
PM E-Mail: xxxxxxxx@xxxx.xxx

SECTION SUBCONTRACTOR(S):

Firm Name
Address 1
Address 2
City, State Zip
Phone (000) 000-0000
Fax (000) 000-0000
PM Name: Full Name
PM E-Mail: xxxxxxxx@xxxx.xx

Firm Name
Address 1
Address 2
City, State Zip
Phone (000) 000-0000
Fax (000) 000-0000
PM Name: Full Name
PM E-Mail: xxxxxxxx@xxxx.xx

SECTION 260513.00 - MEDIUM VOLTAGE CABLES

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

- A. Product Data
 - 1. For each type of cable. Include splices and terminations for cables and cable accessories.

1.2 DEFINITIONS

- A. Jacket: A continuous nonmetallic outer covering for conductors or cables.
- B. Sheath: A continuous metallic covering for conductors or cables.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Comply with IEEE C2 and NFPA 70. Subject to being equivalent and subject to compliance with requirements, provide product by one of the manufacturers listed below.
 - 1. Cables:
 - a. General Cable Technologies Corporation.
 - b. Southwire Company.
 - c. Okonite Company (The).
 - d. Aetna Insulated Wire, Inc.; a Berkshire Hathaway company.
 - e. Kerite; a Marmon Wire & Cable/Berkshire Hathaway company.
 - f. Prysmian Cables & Systems.
 - 2. Cable Splicing and Terminating Products and Accessories:
 - a. 3M; Electrical Markets Division.
 - b. Tyco Electronics; Raychem Products.
 - c. Adalet; a Scott Fetzer company.
 - d. DSG-Canusa; a Shawcor company.
 - e. Engineered Products Company.
 - f. G&W Electric Company.
 - g. MP Husky.
 - h. RTE Components; Cooper Power Systems, Inc.
 - i. Thomas & Betts Corporation.

2.2 CABLES

- A. Comply with UL 1072, AEIC CS8, ICEA S-93-639/NEMA WC 74, and ICEA S-97-682
- B. Conductor: Material as indicated on drawings, with compact round, concentric lay, Class B stranding and no strand filling.

- C. Shielding: Provide 5 mil min. copper tape with 25% overlap, helically applied over semiconducting insulation shield.
- D. Cable Jacket: Chlorinated Polyethylene. Low Friction Jacket acceptable.

2.3 CONNECTORS AND TERMINATIONS

- A. Comply with ANSI C119.4 for connectors between aluminum/copper-clad aluminum conductors or for connections between aluminum/copper-clad aluminum to copper conductors.
- B. Provide Copper-Conductor Connectors: Copper or Aluminum/copper-clad aluminum barrel crimped connectors.
- C. Shielded-Cable Terminations: Comply with the following classes of IEEE 48. Insulation class shall be equivalent to that of cable. Include shield ground strap for shielded cable terminations.
 - 1. Class 1 Terminations: Modular type, furnished as a kit, with stress-relief tube; multiple, molded-silicone-rubber, insulator modules; shield ground strap; and compression-type connector.
 - 2. Class 1 Terminations: Heat-shrink type with heat-shrink inner stress control and outer nontracking tubes; multiple, molded, nontracking skirt modules; and compression-type connector.

2.4 MEDIUM-VOLTAGE TAPES

- A. Ethylene/propylene rubber-based, 30-mil splicing tape, rated for 130 deg C operation. Minimum 3/4 inch wide.
- B. Silicone rubber-based, 12-mil self-fusing tape, rated for 130 deg C operation. Minimum 1-1/2 inches (38 mm) wide.

2.5 SOURCE QUALITY CONTROL

- A. Test and inspect cables per to ICEA S-97-682 before shipping.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cables per IEEE 576. Do not pull wire until raceways are complete, plastering is complete, and raceways are free of debris and moisture. Proof conduits prior to conductor installation by passing a wire brush mandrel and then a rubber duct swab through the conduit. Separate the wire brush and the rubber swab by 48 inches on the pull rope.
 - 1. Wire Brush Mandrel: Consists of a length of brush approximately the size of the conduit inner diameter with stiff steel bristles and an eye on each end for attaching the pull ropes. If an obstruction is felt, pull the brush back and forth repeatedly to break up the obstruction.
 - 2. Rubber Duct Swab: Consists of a series of rubber discs approximately the size of the conduit inner diameter on a length of steel cable with an eye on each end for attaching

the pull ropes. Pull the rubber duct swab through the duct to extract loose debris from the duct.

- B. Pull Conductors: Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values. Where necessary, use manufacturer-approved pulling compound or lubricant that does not deteriorate conductor or insulation. Use pulling means, including fish tape, cable, rope, and basket-weave cable grips, that do not damage cables and raceways. Do not use rope hitches for pulling attachment to cable. Use pull-in guides, cable feeders, and draw-in protectors as required to protect cables during installation. Do not pull cables with ends unsealed. Seal cable ends with rubber tape.
- C. Install exposed work parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
- D. Install "buried-cable" warning tape 12 inches above cable duct banks.
- E. In manholes, handholes, pull boxes, junction boxes, and cable vaults, train cables around walls by the longest route from entry to exit; support cables at intervals adequate to prevent sag.
- F. Install sufficient cable length to remove cable ends under pulling grips. Remove length of conductor damaged during pulling.
- G. Identify phase and circuit number of each conductor at each splice, termination, pull point, and junction box. Arrange identification so that it is unnecessary to move the cable or conductor to read the identification.

3.2 FIELD QUALITY CONTROL

- A. Engage a factory-authorized service representative or other testing agency to test and inspect components, assemblies, and equipment installations, including connections. Prepare test and inspection reports. Medium-voltage cables will be considered defective if they do not pass tests and inspections. Perform the following tests and inspections:
 1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.
 2. After installing medium-voltage cables and before electrical circuitry has been energized, test for compliance with requirements.
 3. Perform direct-current High Potential test of each new conductor per NETA ATS, Ch. 7.3.3. Do not exceed cable manufacturer's recommended maximum test voltage.

END OF SECTION 260513.00

SECTION 260519.00 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

- A. Product Data
 - 1. For each type of conductor and cable.

PART 2 - PRODUCTS**2.1 CONDUCTORS AND CABLES**

- A. Acceptable Manufacturers: Subject to being equivalent and subject to compliance with requirements, provide product by one of the manufacturers listed below, or by an NRTL listed equivalent manufacturer.
 - 1. Alcan Products Corporation; Alcan Cable Division.
 - 2. Alpha Wire.
 - 3. Belden Inc.
 - 4. Encore Wire Corporation.
 - 5. General Cable Technologies Corporation.
 - 6. Southwire Incorporated.
 - 7. American Insulated Wire Corp
 - 8. Republic Wire
- B. Conductor Insulation and Multiconductor Cables: Comply with NEMA WC 70/ICEA S-95-658. Refer to Part 3 of this section for allowable types specific to this project.
- C. MC Cable (Metal-Clad):
 - 1. Provide Type MC Cables that are minimum 90 degrees C rated, with components and fittings listed for grounding, compliant with NEC Articles 250 and 330.
 - 2. Provide cable formed from continuous length of spirally wound, interlocked zinc coated or galvanized (inside and outside) strip steel or aluminum jacket. Provide cables with full parity insulated equipment ground conductor.
 - 3. Provide compatible steel fittings with integral red plastic insulated throat bushings, compliant with NEC 330.

2.2 CONNECTORS AND SPLICES

- A. Acceptable Manufacturers: Subject to being equivalent and subject to compliance with requirements, provide products by one of the manufacturers listed below, or by an NRTL listed equivalent manufacturer.
 - 1. AFC Cable Systems, Inc.
 - 2. Gardner Bender.
 - 3. Hubbell Power Systems, Inc.
 - 4. Ideal Industries, Inc.
 - 5. Ilsco; a branch of Bardes Corporation.
 - 6. NSI Industries LLC.
 - 7. O-Z/Gedney; a brand of the EGS Electrical Group.

8. 3M; Electrical Markets Division.
9. Tyco Electronics.
10. Square D, a Schnieder Electric Company
11. Thomas & Betts
12. Arrow-Hart Div, Crouse-Hinds Co

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

PART 3 - EXECUTION

3.1 APPLICATIONS AND INSTALLATION

- A. Feeders: Refer to Feeder Schedule on drawings.
- B. Branch Circuits: Stranded copper conductors.
- C. Where applicable for electrical equipment connections for aluminum/copper-clad aluminum wiring, provide the following supplemental requirements and work regardless of who furnishes the equipment or what type of equipment is affected.
 1. Review equipment submittals, installation documents and nameplates to determine if there are any warranty or UL limitations regarding copper versus aluminum or copper-clad aluminum wiring connections at equipment.
 2. If there are any limitations, provide local non-fused disconnect at or near equipment (external to the equipment) and terminate aluminum/copper-clad aluminum conductors to the line side terminals of the disconnect switch. Provide copper conductors from load side terminals of the disconnect switch to the respective equipment factory disconnect or terminals as applicable.
 3. Provide UL-Listed AA-8000 series compact-stranded conductors with insulation type compliant with specifications, prevailing codes and end-use equipment manufacturer requirements. Provide appropriately UL-Listed connectors as recommended by conductor manufacturer. Use oxide inhibitor in each splice, termination, and tap for aluminum/copper-clad aluminum conductors.
- D. Unless otherwise noted on drawings, provide conductor insulation rated at 600VAC and 90 degrees C. Provide wire, cable and connectors suitable for the temperature, conditions and location where installed. Provide THHN/THWN insulation for conductors 500 kcmil and larger, and for conductors # 8 AWG and smaller. Provide THW or THHN/THWN insulation for other sizes as appropriate for the locations where installed. Provide XHHW-2 insulation for wiring below grade and for wiring subject to moisture conditions.
- E. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application. Provide with full parity sized insulated equipment ground conductor. Only use Portable Cord for flexible pendant leads to outlets, equipment where indicated, and only where permitted by NEC, by local authority having jurisdiction. Confirm application and color, case by case, with Design Professional.
- F. Grounded ("Neutral") Conductors: Provide dedicated parity sized grounded ("neutral") conductor for each branch circuit phase conductor fed from 15-ampere and 20-ampere branch circuit breakers. Provide grounded ("neutral") conductor in all lighting control device (switch, dimmer, occupancy sensor, etc.) wall outlet boxes, even if not immediately used. Provide grounded ("neutral") conductor for all multi-pole feeders. Provide grounded ("neutral") conductor(s) for all

multi-pole feeders and branch circuits unless this contractor determines in field that the affected load(s) will never have need for a grounded ("neutral") conductor and NEC does not mandate otherwise.

- G. Complete raceway installation between conductor and cable termination points prior to pulling conductors and cables. Use manufacturer UL 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. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- H. Install wire in raceway unless specifically permitted otherwise in this specification section, under other Division 26 sections, or on electrical drawings. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- I. Do not pull wire until raceways are complete, plastering is complete, and raceways are free of moisture. Install joints and splices only at NEC approved panels, accessible junction boxes, or accessible outlet boxes. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary to prevent damage to conductors. Use pulling means, including fish tape, cable, rope, and basket weave wire/cable grips that will not damage cables and raceways. Do not use rope hitches for pulling attachment to wire or cable. Conceal work in finished spaces.
- J. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems." Use of synthetic or plastic "tie-wraps", "zip ties", "wire ties" and similar products are not permitted as a permanent means of anchoring, securing, supporting or otherwise installing any cables, conductors, conduits, raceways, devices, equipment or other electrical work.
- K. Neatly dress work. Install work parallel and perpendicular to surfaces and exposed structural members, and follow surface contours where possible. Keep conductor splices to minimum. Install splice and tap connectors that possess equivalent, or better, mechanical strength and insulation rating than conductors being spliced. Use splice and tap connectors that are compatible with conductor material. Install wires continuous from outlet to outlet. Provide insulation value of joints at least 100 percent more than that of the wire insulation. Provide adequate length of conductors within electrical enclosures, and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than #10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.
- L. De-rate cables per NFPA 70 where bundled, where passing through insulation, and where otherwise required to be compliant with NFPA 70 based on field conditions and/or means and methods that will be used. De-rate conductors per NFPA 70 where required based on quantities of conductors within raceways, and where otherwise required to be compliant with NFPA 70 based on field conditions and/or means and methods that will be used.

3.2 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-486B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors. Install conductor at each outlet with at least 8 inches of slack.

- B. Provide complete assembly of materials for each type of required electrical connection, including but not limited to, pressure connectors, terminal (lugs), electrical insulating tape, heat shrinkable insulating tubing, cable ties, solderless wire-nuts, and other items and accessories as needed to complete splices and terminations of types indicated.
- C. Unless otherwise indicated, provide wires/cables (conductors) for electrical connections that match, including sizes and ratings, of wires/cables that are supplying electrical power. Provide copper conductors with conductivity of not less than 98% at 90 degrees. Provide factory splice kits (U.L. approved for submersion in water and direct burial) for wire splicing in outdoor grade, or slab on grade, junction boxes and for all other wet locations.
- D. Provide electrical connectors and terminals that mate and match, including sizes and ratings, with equipment terminals, and that are recommended by equipment manufacturer for intended applications. Connect wires #6 AWG and larger to panels and apparatus by means of approved lugs or connectors large enough to enclose all strands of the conductors. Provide solderless type connectors
- E. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams. Mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment. Cover splices with electrical insulating material to achieve insulation at least 100 percent in excess of electrical insulation rating of those conductors being spliced. Prepare cables and wires, by cutting and stripping covering armor, jacket, and insulation properly to ensure uniform and neat appearance where cables and wires are terminated. Exercise care to avoid cutting through tapes which will remain on conductors. Do not "ring" copper conductors while skinning wire.
- F. There may be cases where circuit or feeder conductor sizes are too large or too small to fit into the lugs normally supplied with the power distribution equipment or end-use equipment, due to circumstances such as increasing conductor sizes to offset voltage drop, unusual breaker frame sizes, type of conductors used, etc. In such cases provide appropriate factory lug kits for affected equipment if recommended by manufacturer; elsewhere provide insulated butt-splices with tails sized to fit respective lugs.
- G. Ground metal frames of portable and stationary direct-wired electrically operated equipment by connecting frames to the circuit equipment grounding conductor and to grounded metal raceway. Provide necessary electrical connections between the specified equipment and junction boxes, disconnect switches, and starters near equipment with flexible metallic conduit and matched connectors. Do not expose flexible conduit in finished areas.

3.3 CONDUCTOR SIZING

- A. Conductor sizes indicated in Division 26 documents are based on copper unless specifically indicated otherwise on single-line diagram on drawings.
- B. Provide minimum #12 AWG conductor size, unless specifically indicated otherwise on drawings.
- C. Unless specifically indicated otherwise on drawings, provide grounded ("neutral") conductors that are at least parity-sized with corresponding phase/line conductors for all applications.

END OF SECTION 260519.00

SECTION 260526.00 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

- A. Product Data
 - 1. For each type of ground rod, bar and connection type.

1.2 QUALITY ASSURANCE

- A. Provide 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. Comply with UL 467 for grounding and bonding materials and equipment. Comply with ANSI/TIA/EIA-607, "Commercial Building Grounding and Bonding Requirements for Telecommunications." Comply with NFPA 70.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. General: See details and notes on drawings for information regarding grounding busbars and ground rods/electrodes. Except as otherwise indicated, provide copper electrical grounding and bonding systems and materials with assembly of materials including but not limited to cables/wires, connectors, solderless lug terminals, grounding electrodes and plate electrodes, bonding jumper braid, and additional accessories needed for a complete installation. Where materials or components are not indicated, provide products that comply with NEC, UL, and IEEE requirements, and with established industry standards for those applications indicated. Utilize compatible metallic materials throughout system to eliminate galvanic action.
- B. Acceptable Manufacturers: Provide grounding related products by ERICO (an nVent brand) or equivalent where not otherwise specified in Division 26. Provide conductors and connectors as specified in 260519.

2.2 CONDUCTORS AND CONNECTORS AND ELECTRODES

- A. For insulated conductors, provide copper or tinned-copper wire or cable insulated (green-colored) conductors, insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction. For bare copper conductors, provide: Solid Conductors, ASTM B 3; Stranded Conductors, ASTM B 8; Tinned Conductors, ASTM B 33.
- B. Provide connectors listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected. Provide copper or copper alloy bolted connectors for conductors and pipes, pressure type with at least two bolts. Provide clamp type pipe connectors, sized for pipe. Use exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Provide green-colored insulation, unless indicated otherwise. Provide solid conductors for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated. Provide bare copper conductors below grade, No. 2/0 AWG minimum. Provide tinned conductors in corrosive areas. Where installed underground, bury at least 36 inches below grade.

3.2 EQUIPMENT, DUCTWORK AND PIPING GROUNDING

- A. Install insulated equipment grounding conductors as required by NFPA 70 and as otherwise required. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70: all feeders; all branch circuits; expansion couplings; flexible raceway runs.
- B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- C. Water Heaters: Install a separate insulated equipment grounding conductor to each water heater. Bond conductor to heater units, piping, connected equipment, and components.
- D. Grounding and Bonding for Piping:
 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 3. Gas Piping: Bond each portion of an above ground, metal gas piping system in accordance with NEC 250.104(B). Where a portion of metal gas piping does not physically connect to a piece of equipment with an equipment grounding conductor in compliance with NEC 250.104(B)(1), install a dedicated equipment grounding conductor bonded to the affected portion of piping and one of the other approved means in 250.104(B).

3.3 INSTALLATION

- A. Grounding 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.
 1. Where protecting a grounding electrode conductor (GEC) from physical damage with rigid, non-metallic conduit (RNC) use schedule 80 PVC as the raceway.
 2. The structural frame of the building shall not be used as an equipment grounding conductor.

- B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit. Bond straps directly to basic structure, taking care not to penetrate any adjacent parts. Install bonding so vibration is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- C. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except if otherwise indicated.
 - 3. Connections to Structural Steel: Welded connectors.

3.4 LABELING

- A. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed. The labels or text shall be green. Label Text: "GROUND SYSTEM - If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.5 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Inspect, test and adjust components, assemblies, and equipment installations, including connections. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test continuity of each conductor. Test completed grounding system at service disconnect enclosure grounding terminal/bar, and at each location where a maximum ground-resistance level is specified or as required to verify integrity of grounding electrode system. Make tests at ground rods before any conductors are connected.
 - 4. Installed components will be considered defective if it does not pass tests and inspections. Correct malfunctioning work on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new work and retest. Prepare test and inspection reports. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 260526.00

SECTION 260553.00 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 (and IEEE C2 as or if applicable). Comply with NFPA 70. Comply with 29 CFR 1910.144 and 29 CFR 1910.145. Comply with ANSI Z535.4 for safety signs and labels. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 - PRODUCTS

2.1 RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways: Provide black letters on an orange field, and indicate voltage and system or service type.
- C. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- D. Vinyl Labels for Empty "Spare" conduits: Provide labels with description of purpose, and location of opposite end, on each end of conduits provided for future.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size. Provide black letters on orange field for cables carrying circuits at 600 V and Less, and provide legend that indicates voltage and system or service type.
- B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label. Provide preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

2.3 CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide (where permitted by NEC for large feeder and sub-feeder conductors).
- B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.
- C. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed using indelible process.

2.5 SELF-ADHESIVE LABELS

- A. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated, installed level and plumb.

2.6 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes, installed level and plumb.
 - 1. Engraved legend with black letters on white face.
 - 2. Punched or drilled for mechanical fasteners.
 - 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.7 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Arc-Flash Hazard Warning Labels: Provide pre-printed "as-built" labels on power distribution and like equipment to warn of potential electric arc flash hazard. Provide in compliance with Article 110.16 of NFPA 70.
- C. Warning labels and signs shall also include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning for 0-150 volts to ground equipment: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
 - 3. Workspace Clearance Warning for 151-600 volts to ground equipment: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 48 INCHES."

2.8 FIELD IDENTIFICATION LABELS

- A. Identification of Disconnecting Means: Provide pre-printed "as-built" nameplate identification labels at all service equipment. Provide in compliance with Article 110.24 (A) of NFPA 70.
- B. Available Fault Current: Provide pre-printed "as-built" nameplate identification labels at service equipment, switchboards, switchgear, and panelboards to indicate the maximum available fault

current and date calculated. Provide in compliance with Articles 110.22 (A) and 408.6 of NFPA 70.

- C. Circuit Directory/Identification: Provide pre-printed "as-built" identification at circuit sources, using directory cards intended for the purpose, for all circuits. Provide in compliance with Article 408.4 (A) of NFPA 70.
- D. Source of Supply Identification: Provide pre-printed typewritten "as-built" nameplate identification labels at all electrical power distribution equipment that specifically indicates the exact source of the power supply that serves the respective equipment. Provide in compliance with Article 408.4 (B) of NFPA 70.
- E. In addition to other labelling required herein or by NFPA 70, provide pre-printed "as-built" identification of the following at all service entrance equipment.
 - 1. Potential Electric Arc Flash Hazards compliant with Article 110.16(A) of NFPA 70.
 - 2. Nominal System Voltage.
 - 3. Single-Phase, Three-Phase/Three-Wire or Three-Phase/Four-Wire as applicable.
 - 4. Available fault Current at Overcurrent Protective Devices.
 - 5. The Clearing Time of Service Overcurrent Protective Devices based on the available fault current at the service equipment.
 - 6. The Date that the label was applied.

2.9 CABLE TIES

- A. For use when attaching identification components, plaques, signs, etc. only.
- B. UV-Stabilized Cable Ties
 - 1. Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
 - 2. Minimum Width: 3/16 inch.
 - 3. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
 - 4. Temperature Range: Minus 40 to plus 185 deg F.
 - 5. Color: Black.
- C. Plenum-Rated Cable Ties
 - 1. Self -extinguishing, UV stabilized, one piece, self-locking.
 - 2. Minimum Width: 3/16 inch.
 - 3. Tensile Strength at 73 deg F, According to ASTM D 638: 7000 psi.
 - 4. UL 94 Flame Rating: 94V-0.
 - 5. Temperature Range: Minus 50 to plus 284 deg F.
 - 6. Color: Black.

2.10 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify final operational and as-built identity of each item before installing identification products. All equipment & system identification nomenclature shown on drawings and listed herein may be shown for general design and installation reference only. Field-verify the actual nomenclature prior to fabrication. Prepare record documents accordingly. Unless determined otherwise in field, provide text matching terminology and numbering of the contract documents.
- B. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. No labeling is required for raceways with readily identifiable terminations within the same room.
- C. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- D. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied. Coordinate installation of identifying devices with location of access panels and doors. Install identifying devices before installing acoustical ceilings and similar concealment.
- E. Apply identification devices to surfaces that require finish after finish work is complete. Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- F. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.
- G. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- H. Cable Ties: For attaching tags. Cut off excess lengths after installing ties. Use general-purpose type, except the following: Outdoors, UV-stabilized nylon; Indoors: Plenum rated.
- I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or envelope/encasement exceeds 16 inches overall. Install line marker for every buried cable, regardless of whether direct-buried or installed in conduit.

3.2 IDENTIFICATION DEFINITION

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less: Identify raceways, cables, junction and pull boxes with self-adhesive vinyl label. Locate at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas. Label with the system voltage and the applicable systems as follows: Power.
- B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in pull and junction boxes, and handholes, use color-coding to identify the phase. Color shall be factory applied to conductor insulation or field applied for sizes No. 4 AWG and larger, if authorities having

jurisdiction permit. These colors apply for factory-assembled cables as well as for individual insulated conductors. Use colors listed below for conductors.

1. Colors for 208/120-V Circuits:
 - a. Phase A: Black
 - b. Phase B: Red
 - c. Phase C: Blue
 - d. Neutral: White
2. Color for Equipment Grounding: Green
3. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- C. Install instructional signs including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- D. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive, self-laminating polyester labels or self-adhesive vinyl labels with the conductor or cable designation, origin, and destination.
- E. Control-Circuit Conductor Termination Identification: For identification at terminations provide heat-shrink preprinted tubes, or self-adhesive, self-laminating polyester labels or self-adhesive vinyl labels with the conductor designation.
- F. Conductors to Be Extended in the Future: Attach write-on tags or marker tape to conductors and list source.
- G. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- H. Locations of Underground Lines: Identify with underground-line warning tape. Install underground-line warning tape for both direct-buried cables and cables in raceway. Install detectable tape at trenches containing empty conduits and conduits containing optical fiber cable.
- I. Branch Circuits for Electric Signs and Outline Lighting: Where electric signs and outline lighting are installed in compliance with Article 600 of NFPA 70 provide the following identification scope of work:
 1. Where the disconnecting means for the sign is installed remote from the sign, provide permanent marking at disconnecting means identifying the sign and its location.h
- J. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels. Comply with 29 CFR 1910.145. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access. For equipment with multiple power or control sources, apply to door or cover of equipment including.
- K. Operating and Warning Instruction Signs: Provide pre-manufactured operating and warning signage if indicated on drawings and where required by NEC or local authority having jurisdiction. Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

- L. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch high letters for emergency instructions at applicable equipment.
- M. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:
 - a. Equipment: Self-adhesive, engraved, laminated acrylic or melamine label for normal conditioned areas, and mechanically-fastened engraved, laminated acrylic or melamine label for areas with adverse environments (outdoor, unconditioned, high humidity, detrimental vapors, etc.). Unless otherwise indicated, provide a single line of text with 1/2-inch high letters on 1-1/2-inch high label; where two lines of text are required, use labels 2 inches high.
 - b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - c. Select and install mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure. Secure to substrate with stainless steel fasteners on main switchboards and switchgear and in locations where adhesives cannot be expected to work long-term due to environmental conditions
 - 2. Equipment to Be Labeled: (Project may not include all pieces of equipment.)
 - a. Power Distribution Equipment Enclosures and Cabinets including the following:
 - 1) Section number
 - 2) Typewritten directory of circuits in the location provided by equipment manufacturer
 - 3) Clear description of upstream equipment / device from which the power originates (including source equipment tag/number, source circuit number and physical location of source)
 - 4) Labeling shall include indication of location of generator output disconnect(s), placed on exterior of generator enclosure and placed at location of utility main service disconnect(s) for the facility
 - b. Access doors and panels for concealed electrical items.
 - c. Monitoring and local/remote-controlling devices via engraved nameplates or wall plates as applicable.
 - d. Other similar equipment designated by Owner's Representative or Design Professional in field.
 - e. Service Entrances: Include name of engineering firm, name of installing contractor and year of installation at service-entrance equipment.
- N. Fire Alarm Systems: Provide permanent identification for boxes, enclosures, etc. that are associated with fire alarm system work. Paint and identify fire alarm system pull boxes, junction boxes, and other access/pull points (boxes and covers) in accordance with NEC/NFPA. Provide fire alarm system control panel equipment cabinets, enclosures, etc. with engraved nameplates (white letters on red background) with the first line of text to read "FIRE ALARM" and the remaining lines to include the necessary descriptive text. Properly identify system components, wiring, cabling, and terminals. Install framed instructions in a location visible from fire-alarm control unit. Provide red color on jacket of all fire alarm cables associated with the fire alarm system. Provide red-colored breaker handle and red-colored lock-on device at source circuit breakers that feed fire alarm related equipment. Provide red coloring for all fire alarm system junction boxes, along with identification.
- O. Emergency Systems: Provide permanent identification for raceways, cables, boxes, enclosures, etc. that are associated with emergency system work, compliant with NFPA 70, including Article

700.10. Paint and identify emergency system pull boxes, junction boxes, and other access/pull points (boxes and covers) in accordance with NEC. Provide emergency system equipment panelboards, cabinets, enclosures, etc. with engraved nameplates (white letters on red background) with the first line of text to read "EMERGENCY CIRCUITS" and the remaining lines to include the necessary descriptive text. Properly identify system components, wiring, cabling, and terminals. Provide red color on jacket of all emergency system cables. Provide red-colored breaker handle and red-colored lock-on device at source circuit breakers that feed emergency systems. Provide red coloring for all fire alarm system junction boxes, along with identification.

END OF SECTION 260553.00

SECTION 260584.00 - MECHANICAL EQUIPMENT**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

A. Refer to documents of other divisions for further requirements associated with equipment and devices that are addressed in this section. This section includes supplemental information related to electrical work associated with mechanical equipment and other equipment furnished and/or installed under all other divisions or by others. Information included in this section applies not only to traditional mechanical equipment, but also to equipment of any kind that is furnished and/or installed by any supplier or installer.

PART 2 - PRODUCTS - REFER TO APPLICABLE SPECIFICATION SECTIONS**PART 3 - EXECUTION****3.1 GENERAL**

A. Common Requirements:

1. Provide all necessary electrically related work as required to render all mechanical equipment (including plumbing, heating, ventilating and air conditioning equipment) fully operational and fully compliant with NEC. This includes, prior to ordering materials or commencing with rough-in, reviewing equipment submittal data and coordinating with installing contractors to ensure the correct size, rating and quantity of conductors are provided.
2. Refer to Coordination Schedules on drawings. Provide disconnects, controllers, starters, accessories, wiring, connections, services, etc. where defined as "EC" in the schedule. Information in this section supplements the information in the HECS.
3. Provide power wiring and connections for all equipment (including motor dampers, accessories, etc. as applicable) as required to render equipment fully operational.
4. Provide engraved plates at all local disconnects and/or controllers with equipment identification and mark indicated.
5. Install local disconnects and/or controllers at 48 inches to top of outlet box or enclosure as applicable above finished floor/slab/grade; provide flush mounted units in finished areas. Provide key operated controllers where accessible to general staff and/or general public.
6. Drawn locations of equipment and devices are shown only for schematic indication of wiring requirements. Coordinate with locations and rough-in requirements as required to determine actual locations and termination requirements. Refer to all contract documents for additional electrical requirements and concerns, and for further representation of this work.
7. Provide raceway, wiring, connections, and terminations for power and interlocks for electrically operated equipment. Provide disconnect switches and/or starters for mechanical equipment unless specifically indicated otherwise herein or on the drawings.
8. Provide disconnect switch ahead of all equipment, including controls, unless the mechanical equipment comes with integral NEC-compliant disconnect(s). Provide NEMA 3R enclosures where installed outdoors and where installed indoors in areas subject to moisture. Ground metal frames of equipment by connecting frames to the grounded

metal raceway or to a full size green ground conductor or both. Provide the necessary electrical connections between the specified equipment and the junction box near equipment with flexible metallic conduit (liquid-tight outdoors) and matched connectors (see Section 26 05 33). Where mechanical equipment lugs cannot accommodate conductor sizes shown on drawings, provide ILSCO ClearTap Insulated Multi-Tap Connectors.

9. Sizes, electrical ratings, etc. of equipment and wiring shown on drawings are based on the respective equipment design base manufacturers. If different manufacturer(s) or model(s) are actually supplied, provide necessary coordination in field (prior to ordering materials and prior to rough-in) and provide the necessary size of related electrical equipment, wiring, conduit, etc.
10. Prior to furnishing submittals and prior to rough-in, determine exact electrically related characteristics, loads, voltages, disconnects and/or starters, and accessory requirements, locations, mounting heights, connection points, etc. of mechanical equipment.
11. Provide lugs, lug kits and related accessory work as required to accommodate the conductor sizes and quantities needed for each application. Coordinate with single-line diagram, field conditions, equipment installers, etc.
12. Coordinate in field with the respective trades and determine case by case, which equipment is factory listed for use with Heating and Air Conditioning Rated (HACR) breakers. In an effort to minimize requirements for stocking of fuses by the Owner, utilize HACR breakers at the source panelboards as the NEC required overcurrent protection wherever possible (in lieu of fusing local disconnect switches).
13. Disconnect Switch and/or Starter Locations: Locations shown on drawings are indicated for schematic purposes only. Determine exact locations in field so that they are compliant with NEC Article 110.26.
14. Supplemental Work for Aluminum and Copper-Clad Aluminum Conductor Electrical Equipment Connections (regardless of who furnishes the equipment): Provide local disconnect at or near equipment (external to the equipment) and terminate aluminum/copper-clad aluminum conductors to the line-side lugs/terminals of the disconnect switch. Provide copper conductors from load-side lugs/terminals of the disconnect switch to the respective equipment factory disconnect or lugs/terminals as applicable. Coordinate all related work with all affected installers.

B. Maintenance Receptacles for Equipment: Provide duplex GFCI receptacle within 25 feet of all electrically operated equipment of any nature that requires periodic testing or maintenance. This applies for all indoor and outdoor equipment. Provide Type WR duplex GFCI weatherproof receptacle for outdoor applications (including rooftops) and for applications subject to high humidity or moisture.

C. Equipment and Systems:

1. HVAC Equipment with Multiple Integral Electrically-Operated Components: Provide separate power feeds or single power feed as directed in field by the HVAC installer (field verify prior to rough-in). Modify disconnect and/or starter requirements accordingly, if required. Provide additional dedicated 120V, 20A branch circuit for each unit from nearest panelboard (if not indicated clearly on the electrical drawings) for internal factory-installed lighting and receptacles. Provide conduit, wiring, and overcurrent protection for this work, and terminations to connections within the heat recovery units for this lighting and convenience power.
2. Control Wiring:
 - a. General: Unless specifically indicated as empty conduit on drawings or herein, provide electrical control and interlock work as shown on drawings. Provide additional control work as specifically indicated herein. Coordinate HVAC thermostat and sensor locations in field (case by case) with Design Professionals, Owner's Representative and equipment installer to ensure that they are placed in locations that will not interfere with furniture, equipment, artwork, wall-hung

specialties, room finishes, etc. Field-verify these wall locations case by case, prior to rough-in, since locations shown on drawings are schematic only.

- b. Schematic Thermostat and Sensor Locations: Refer to HVAC drawings and documents to determine locations and quantities if locations are not shown on electrical drawings, and to confirm locations and quantities even if locations are shown on electrical drawings.
- c. Low Voltage Thermostats and Sensors: Provide 4-inch square by 2-1/8 inch deep wall outlet boxes at 46 inches above finished floor to center of outlet box (with single-gang rings) for each unit. Provide one 3/4-inch empty conduit from each location, turned out above accessible ceilings (in joist space or against overhead slab/deck). Identify conduit in ceiling cavity; provide sweep bends, bushings and drag line.
- d. Line Voltage Thermostats and Sensors: Provide 4-inch square by 2-1/8 inch deep wall outlet boxes at 46 inches above finished floor to center of outlet box (with single-gang rings) for each unit. Provide line voltage power wiring, in 3/4-inch conduit, and connections from thermostats and sensors to respective equipment that is to be controlled by same. Install thermostats and sensors.

3. Domestic Water Heaters (Electric): Provide local disconnect switch, and power wiring and connections. Provide interlock wiring with circulating pumps, flow switches and aquastat controls as applicable. Refer to wiring diagrams on drawings for further definition where applicable.
4. Domestic Hot Water Circulating Pumps (Return Line): Provide manual starter with pilot light, and wire pump to operate through the aquastat. Refer to wiring diagrams on drawings for further definition.
5. Electric Water Coolers (Surface): Provide 120V duplex receptacle. Provide GFCI circuit breaker to feed the circuit that serves electric water coolers, even if not indicated on panelboard schedule. Install at height and location as directed by water cooler installer. Conceal outlet within water cooler enclosure if enclosure is designed for such an installation. Assemble and connect cord if needed. Coordinate all specifics with water cooler installing contractor prior to rough-in of related work.
6. Electronic Plumbing Fixture Valves: Provide electrical wiring and connections as required for full automatic operation of direct-wired electronic sensor operated lavatory, urinal and water closet valves. Install and wire 120VAC/24VAC remote box mounted transformers. Install above nearby accessible acoustical tile ceiling and provide local single-pole switch above ceiling at the transformer to switch primary power. Provide secondary fusing if not integral to the transformer (verify in field). Provide required 24VAC wiring (#14 AWG "MC" Cable with ground), concealed. Field coordinate work carefully prior to rough-in.
7. Domestic Hot Water Circulating Pumps (Heater to Tank): Provide manual starter with pilot light, and wire pump to operate through the aquastat. Refer to wiring diagrams on drawings for further definition.
8. Package Hot Water Pump System: Provide line voltage power wiring and connections to the line side of factory disconnect switch. Refer to wiring diagrams on drawings for further definition where applicable.

END OF SECTION 260584.00

SECTION 26 08 00.00 - COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The requirements of this Section apply to all sections of Division 26.
- B. This project will have selected building systems commissioned. The complete list of equipment and systems to be commissioned are specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. The commissioning process, which the Contractor is responsible to execute, is defined in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. A Commissioning Agent (CxA) will manage the commissioning process.

1.2 RELATED WORK

- A. Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.

1.3 SUMMARY

- A. This Section includes requirements for commissioning the electrical systems, subsystems and equipment. This Section supplements the general requirements specified in Section 01 91 00 General Commissioning Requirements.
- B. The commissioning activities have been developed to support delivery of an efficient project in accordance with the Contract Documents developed by the design team Owner's Project Requirements.
- C. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for more specifics regarding processes and procedures as well as roles and responsibilities for all Commissioning Team members.

1.4 DEFINITIONS

- A. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for definitions.

1.5 COMMISSIONED SYSTEMS

- A. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS PRODUCTS for the list of systems to be commissioned.

PART 2 - EXECUTION

2.1 FUNCTIONAL PERFORMANCE TESTING

A. Contractor tests as required by other sections of Division 26 shall be scheduled and documented in accordance with Section 01 00 00 GENERAL REQUIREMENTS. The Commissioning Agent will work with the CM to incorporate the Functional Performance Testing schedule into the master construction schedule. The CxA will conduct and witness all Functional Performance Testing performed by the Contractors. The commissioning process includes Functional Performance Testing that is intended to test systems functional performance under steady state conditions, reactions to changes in operating conditions and performance under emergency conditions. The contractors shall review and comment on the functional performance tests prior to testing.

END OF SECTION 260800.00

SECTION 260923.00 - LOCAL LIGHTING CONTROLS**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

- A. Product Data
 - 1. For equipment, materials and systems specified in this section. Include product data, descriptive information, technical data, wiring diagrams, load restrictions, etc.
- B. Shop Drawings
 - 1. Where occupancy/vacancy sensors are used, submit shop drawings with final sensor quantities, types, locations, and coverage patterns showing full coverage of the affected spaces/areas.

1.2 GENERAL REQUIREMENTS

- A. Finishes & Wall Plates: Refer to specification 262726.00 – Wiring Devices and match all requirements.

PART 2 - PRODUCTS**2.1 GENERAL**

- A. Wired vs. Wireless Controls
 - 1. This project shall utilize wired or wireless controls.
 - 2. Wireless Controls
 - a. Battery life: 10 year minimum with early warning detection/notification
 - b. Signal strength: 100 feet minimum clear line of site, 50 feet minimum through typical construction materials
 - 1) Where a mesh system is employed: 25' minimum between fixtures, 75' minimum from gateway

2.2 TOGGLE SWITCHES

- A. Refer to specification 262726.00 – Wiring Devices.

2.3 WALL-BOX DIMMERS

- A. General: Comply with UL 1472
 - 1. Do not break off the side heat-sink sections when ganging.
 - 2. Provide dedicated neutrals for circuits serving loads controlled by dimmers.
 - 3. Provide controls that are fully compatible with light fixtures being dimmed. Provide all low voltage control wiring necessary to render controls fully functional.
- B. Manufacturers: Obtain all devices from a single manufacturer. Subject to compliance with requirements, provide products by one of the following:

1. Eaton
2. Hubbell
3. Leviton
4. Legrand
5. Lutron

C. Dimmer Switches: Modular, full wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters. Provide continuously adjustable slider or pushbutton control, with configurations shown on the drawings. Where 3-way dimming is shown on the drawings, provide digital dimmer switches to accomplish this.

2.4 OCCUPANCY SENSORS

A. General

1. Provide a 5-year warranty on all occupancy sensors unless a longer warranty is specified elsewhere in these contract documents.
2. Capable of operating LED drivers, electronic ballasts, and rated motor loads.
3. Provide sensors with coverage that remains constant after sensitivity control has been set. Automatic reduction in coverage due to the cycling of HVAC systems is not permitted.
4. Readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor, not the control unit, and recessed to limit tampering.
5. Provide manual bypass override on each sensor to accommodate failures. Configure so that when bypass is utilized, lighting remains on unless controlled by another method until bypass is deactivated.
6. Provide with LED indication of motion both during testing and normal operation.
7. Where specified, provide sensor with internal additional isolated relay with Normally Open, Normally Closed and Common outputs for use with HVAC control, Data Logging, and other control options. Do not use sensors that utilize separate components or specially modified units to achieve this function.
8. UL rated, 94V-0 enclosures.

B. Manufacturers: Obtain all devices from a single manufacturer. Subject to compliance with requirements, provide products by one of the following:

1. Lutron
2. GE Current a Daintree Company
3. Leviton
4. Crestron
5. Hubbell
6. Legrand
7. Phillips
8. Cooper Lighting Solutions
9. Acuity Brands

C. Infrared Sensors: Utilize pulse count processing and digital signature analysis to respond only to those signals caused by human motion and that provide high immunity to false triggering from RF and electrical noise on the line. Provide with multiple segmented Fresnel lenses, in a multi-tier configuration, with grooves to eliminate dust and residue build-up.

D. Ultrasonic Sensors: Utilize advanced signal processing to adjust the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout the space. Crystal control operating frequency at 25kHz within +/- 0.005% tolerance, 32 kHz within =/-0.002@ tolerance, or 40kHz within =/-0.002% tolerance to assure reliable performance and eliminate sensor crosstalk. Do not use sensors with multiple frequencies.

- E. Dual-Technology Sensors: Provide passive infrared and ultrasonic technologies for occupancy detection. Once occupancy is detected, either infrared or ultrasonic detection shall keep controlled light fixtures on until neither has been detected for the specified amount of time.
- F. Wall-Switch Sensors:
 - 1. Capable of detection of occupancy at desktop level up to 300 square feet, and gross motion up to 1000 square feet.
 - 2. Utilize zero crossing circuitry to increase relay life, protect from the effects of inrush current, and increase sensor's longevity.
 - 3. No leakage current to load, in manual or auto off mode for safety purposes, and voltage drop protection.
 - 4. Field selectable option to switch from occupancy (auto on) to vacancy (manual on) modes.
 - 5. Do not provide products that utilize a soft lens.
- G. Circuit Control Hardware:
 - 1. Externally mounted through a 1/2" knock-out on a standard electrical enclosure
 - 2. Integrated, self-contained units consisting internally of isolated load switching control relay and transformer to provide low-voltage power
 - 3. Capable of providing power to a minimum of (2) sensors
 - 4. Provide control wiring between control unit and sensors that is Class II, 18-24AWG, standard UL minimum #12 AWG
 - 5. Rated for 20A at 120/277V

PART 3 - EXECUTION

3.1 GENERAL

- A. Installation: Provide grounded ("neutral") conductor in all lighting control device (switch, dimmer, occupancy sensor, etc.) wall outlet boxes, even if not immediately used.
- B. Occupancy Sensors
 - 1. Locate and aim sensors in the correct location required for complete and proper coverage of controlled areas per the manufacturer's recommendations. Provide 90-100% coverage in controlled areas to completely cover the controlled areas and accommodate all occupancy habits of single or multiple occupants at any location within the areas. The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the areas which are to be provided with sensors. Provide additional sensors if required to properly and completely cover the respective area.
 - 2. Arrange a pre-installation meeting with manufacturer's factory authorized representative, at Owner's facility, to verify placement of sensors and installation criteria.
 - 3. Exercise proper judgment in executing the installation to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components.
 - 4. Provide, at the Owner's facility, the training necessary to familiarize the Owner's personnel with the operation, use, adjustment, and problem-solving diagnosis of the occupancy sensing controls.
 - 5. Upon completion of the installation, provide complete commissioning for controls by the manufacturer's factory authorized technician who will verify adjustments and sensor placement to ensure trouble-free occupancy-based lighting controls. Provide the Owner and Design Professionals with ten working days written notice of the scheduled commissioning date. Upon completion of related work, including fine tuning, provide factory authorized technician training to the Owner's personnel in the adjustment and maintenance of the sensors.

END OF SECTION 260923.00

SECTION 260943.00 – DIGITAL LIGHTING CONTROLS**PART 1 - GENERAL****1.1 SYSTEM DESCRIPTION**

- A. This specification covers all lighting controls that are digital in nature. They are programmable, customizable, and communicate within the space they serve to other lighting devices forming a system. They may also communicate outside of the space they serve with a networked system.

1.2 SUBMITTAL REQUIREMENTS

- A. Product Data
 - 1. For equipment, materials and systems specified in this section: include product data, technical data, wiring diagrams, panel schedules, bus configurations, load restrictions, sequence of operation, switch plate designs, etc.
- B. Shop Drawings
 - 1. Provide manufacturer furnished shop drawings that detail all system components, wiring/cabling connections, coverage patterns for sensors, etc.

1.3 EXTRA MATERIALS

- A. Relays/Dimming Panels: Where relay/dimming panels are used, furnish spare relays/dimming relays equal to 10% of total project quantity not exceeding (10).

1.4 GENERAL REQUIREMENTS

- A. Finishes & Wall Plates: Refer to specification 262726.00 – Wiring Devices and match all requirements.
- B. Specific Lighting Control Details: The drawings may or may not include system specific diagrams and details from one of the approved manufacturers listed below. These details are intended to describe the intent of the system and are not a replacement for system details that shall be provided by the lighting control system manufacturer.
- C. Sequences of Operation: Refer to drawings for intended sequences of operation, scene descriptions, etc. The system provided shall comply with these requirements.
- D. Provide relays and modules that are fully compatible with all components of the dimmable fixtures and control systems, while resulting in a maximum of 20 percent total harmonic distortion for the collective installation.
- E. Provide all conductors, cabling, and components required to render the control methods and sequences shown on the drawings fully functional. This includes all low voltage cabling between luminaires and lighting controls.

1.5 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of lighting controls that fail in materials or workmanship within (5) years from date of substantial completion.
 - 1. Make ordering of new equipment for expansions, replacements, and spare parts available to end user for a minimum of (10) years from date of substantial completion.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Manufacturers: Obtain all lighting controls and related components from a single manufacturer. Subject to compliance with requirements, provide products by one of the following:
 - 1. Lutron
 - 2. GE Current a Daintree Company
 - 3. Leviton
 - 4. Crestron
 - 5. Hubbell Control Solutions
 - 6. Wattstopper by Legrand
 - 7. Acuity Brands
- B. Listings and Standards
 - 1. Comply with 47 CFR, Subpart A and Subpart B, for Class A digital devices. Comply with NFPA, NEMA, and FCC Emission requirements for Class A applications. Comply with NFPA 70 700-9(b) for emergency source circuits that are controlled in normal operation by a panel. Provide lighting control system that is listed, approved and in compliance with national, state and local energy codes including but not limited to California Title 24 and ASHRAE 90.1-2004.
 - 2. UL Approvals: Provide panels and devices that are UL listed under UL 916 Energy Management Equipment. Provide configured to order or custom panels that are UL Listed under UL 508, Industrial Control Panels. Provide panels controlling emergency circuits that are UL or ETL listed to UL 924.
 - 3. FCC Approved. Complies with the limits for a Class B device, pursuant to Part 15 of the FCC rules.
 - 4. Complies with requirements for the use in other spaces used for environmental air (plenums) per NEC 2014 300.22(C)(3).
 - 5. Cybersecurity Compliance: Comply with IoT UL Security Rating UL 1376 for Cybersecurity Services and standard requirements listed under ANSI/UL 2900-1.
 - 6. Wireless Controls:
 - a. Comply with IEEE 802.15.4
- C. Expansion Requirements: Capacity for future expansion of control functions by 25 percent of current capacity; to include equipment ratings, housing capacities, spare spaces for circuits, terminals, number of conductors in control cables, and control software.
- D. Wired vs. Wireless Controls
 - 1. This project shall utilize wired or wireless controls.
 - 2. Wireless Controls
 - a. Battery life: 10 year minimum with early warning detection/notification
 - b. Signal strength: 100 feet minimum clear line of site, 50 feet minimum through typical construction materials
 - 1) Where a mesh system is employed: 25' minimum between fixtures, 75' minimum from gateway

- E. Low-Voltage Cabling Requirements
 - 1. Low voltage control cable is permitted for low-voltage lighting control devices.
 - a. Provide consistent cable color for all lighting controls. Coordinate color with technology system installer(s), existing conditions, and Owner and provide a unique color that does not match any other low voltage system cabling color in the building.
- F. Emergency Lighting: Where any luminaires designated as emergency are controlled, all components of the system involved in controlling these luminaires shall be UL or ETL listed to UL 924 and UL 1008. Provide separate control equipment, or barriers within equipment, to keep complete separation between emergency and all other branches of power in compliance with NFPA 70. Provide load control relays, emergency lighting transfer switches, phase loss monitoring, and fire alarm system interfaces as required to turn all emergency lighting on to full brightness upon loss of normal building power or upon alarm activation of fire alarm systems. Provide all programming, hardware and wiring required. Refer to specifications 260533.00 and 260553.00 for additional information pertaining to the installation and identification of emergency systems.

2.2 EXISTING SYSTEM EXPANSION

- A. General
 - 1. Provide products by the same manufacturer as the existing system unless specifically noted otherwise.
 - 2. Provide products that are compatible with the existing system, including any accessories necessary to interface new products with the existing system.
- B. Software
 - 1. Coordinate with lighting control system manufacturer and provide as part of base bid any available upgrades to the existing system's software, firmware, etc. even if these upgrades come at a cost from the manufacturer.
 - 2. Upgrade existing software as required to accommodate new system components. This may include updating graphical interfaces, maps, controllers, etc.

2.3 CONTROL STATIONS

- A. Configuration: Switches for digital lighting controls shall be pushbutton or touchscreen style.
- B. Control functions: Each switch shall have the following control functions, at a minimum. Refer to drawings for additional control functions, including scenes:
 - 1. On
 - 2. Off
 - 3. Dimming increase
 - 4. Dimming decrease
 - 5. Return to preset light level
- C. Features:
 - 1. LED Pilot Lights: On to indicate which control sequence is active
 - 2. All surfaces and graphics shall be resistant to scratching and cleaning
 - 3. All buttons shall be factory engraved with their purpose. Where the control station is not installed in the same space as the lighting that it controls, it shall be engraved with the name of the space(s) and/or area(s) that it controls. No field applied labels are acceptable.

2.4 STAND-ALONE LIGHTING CONTROL SYSTEMS

- A. Standalone systems function only within the space that they are installed. They do not communicate with other systems or with a central networked system.
- B. Access and Control
 - 1. Access Control
 - a. All control functionality shall be capable of being restricted to only approved users by the system administrator.
 - 2. System Control
 - a. System administrators shall have access to modify the system(s) via local or app-based controls.
 - b. Sequence of operations for the lighting controls for each zone within the space shall be modifiable and include, at a minimum, the modification of the following items where these features are shown on the drawings. Refer to drawings for any additional zone controls required.
 - 1) Occupancy sensor timeout
 - 2) Daylight sensor/photocell sensitivity
 - 3) Scene control
 - 4) Timed schedules
 - 5) Dimming levels
 - 6) Dimming rate
 - 7) Color tuning, where luminaires are installed with this capability
 - 3. Occupant Control
 - a. Occupants of the spaces where the systems are installed shall have local and app-based control of the standalone lighting control systems within a space. Sequence of operations for the lighting controls within the space shall be modifiable. At a minimum, control shall include:
 - 1) On/off
 - 2) Dimming per zone
 - 3) Color tuning, where luminaires within the space are installed with this capability

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide grounded ("neutral") conductor in all line voltage lighting control device (switch, dimmer, occupancy sensor, etc.) wall outlet boxes, even if not immediately used.
- B. Comply with NFPA 70 and NECA 1. Install equipment in accordance with manufacturer's installation instructions. Provide equipment at locations and in quantities indicated on Drawings. Provide any additional equipment required to provide control intent.
- C. Where low-voltage cabling is permitted by this specification, install low-voltage cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring methods may be used. Conceal raceway and cables except in unfinished spaces where other electrical work is exposed.
 - 1. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

2. Comply with requirements for cable trays specified in Section 260536 "Cable Trays for Electrical Systems." Install plenum cable where exposed in environmental air spaces, including plenum ceilings.
3. Comply with requirements for J-Hooks specified in Section 260537 "J-Hook pathways for Electrical Systems." Install plenum cable where exposed in environmental air spaces, including plenum ceilings.

D. Install panels and accessories according to NECA 407. Mount top of trim no higher than 78 inches above finished floor or grade. Mount panel cabinet plumb and rigid without distortion of box. Mount recessed panel with fronts uniformly flush with wall finish and mating with back box. Install filler plates in unused spaces.

E. Verify locations, configurations, and programming in field with Owner and Design Professionals prior to ordering and rough-in.

F. Provide custom programming, training, power/control wiring and accessories, including power booster units if required, in types and quantities as required for complete operational systems and to fulfill the performance requirements. Provide custom scene sequencing and programming for all possible use combinations in field after meeting with affected entities.

G. Comply with Section 260553 "Identification for Electrical Systems." Identify system components, wiring, cabling, boxes, cabinets, and terminals. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs. Identify all ceiling-mounted controls with data bus number and device address. Label each device cable within 6 inches of connection to bus power supply or termination block. For panels, create a directory to indicate loads served by each circuit; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are unacceptable. Panel Nameplates: Label each panel with a nameplate.

3.2 FIELD QUALITY CONTROL

A. Engage a factory-authorized service representative to perform Tests and Inspections and Reports.

1. Systems Integration, Equipment Integration Meeting Visit: Coordinate meeting between Owner's Representative, Lighting Control System Manufacturer, Design Professional(s), installers, and other related equipment manufacturers' representatives prior to furnishing product submittals or procuring product to discuss equipment and integration procedures and review system operation and sequence of operation. The intent is to make sure each party understands how the system should operate after installation and how it should be installed, and to ensure full compatibility between all associated elements of the system.
2. Prepare Field Test Reports, including the following:
 - a. Printed list of all points created from actual queries of all addressed control points to include manual controls, automatic controls, sensors, etc.
 - b. Event log verifying the performance of all devices generating event messages to include sensors, control buttons, alarm messages, and any other change of value messages.
 - c. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to emergency source and the retransfer to normal.

3.3 STARTUP SERVICE

A. Complete installation and startup checks according to manufacturer's written instructions. Engage a factory-authorized service representative to perform startup service.

1. Factory-authorized service representative shall make a minimum of 3 site visits to ensure proper system installation and operation. Upon completion, provide a written statement verifying that all system requirements have been met. Visits shall include, at a minimum, the following.
 - a. Confirm entire system operation and communication to each component.
 - b. Confirm operation of all individual system components.
 - c. Confirm system programming, sensor settings, override settings, etc.
 - d. Confirm sensors are located, installed, and adjusted as intended by the factory and the contract documents.
 - e. Confirm that approved sequence of operations has been achieved.
- 2.
3. Engage factory-certified field service engineer to perform a site visit to ensure proper system installation and operation under following parameters:
 - a. Make a visit upon completion of installation of lighting control system:
 - 1) Verify connection of power feeds and load circuits.
 - 2) Verify connection and location of controls.
 - 3) Program system data.
 - 4) Verify proper connection of digital control link.
 - 5) Verify proper operation of manufacturers interfacing equipment.
 - 6) Obtain sign-off on system functions.
 - 7) Train users on system operation.

3.4 DEMONSTRATION

- A. Engage factory authorized technician to train Owner's personnel in the operation, adjustment, programming, and maintenance of the lighting control system including ancillary components and functions such as occupancy sensors and daylighting controls. Provide minimum of eight hours over two days of factory on-site training.
- B. Additional Training Visit: Lighting Control System Manufacturer to provide 1-day additional on-site system training to site personnel.

END OF SECTION 260943.00

SECTION 262116.00 - LOW-VOLTAGE UNDERGROUND ELECTRICAL SERVICE ENTRANCE

PART 1 - GENERAL

1.1 ELECTRICAL POWER SERVICE

- A. The electric service includes utility company transformer as indicated on drawings, furnished by local utility company, with secondary voltage as indicated on drawings.
- B. Furnish and install all work in strict compliance with all requirements set forth by the utility company providing electrical service for the project. Procure all needed details and information directly from the utility company as required for complete operational installations. Furnish and install all electrical work accordingly. Such work includes, but is not limited to: Pads, bases, vaults, pits, manholes, metering, supports, conduit, wiring, connections, maintaining clearances, testing, inspections and ancillary work as applicable.
- C. Determine available fault current from electric utility company and provide appropriately rated electrical service and distribution equipment to accommodate not only the initial transformer proposed by the utility company, but also a future larger transformer if applicable to allow for full usage of the electrical service capacity.
- D. Where indicated in project manual, or where indicated on drawings, or where required by NEC, install ground-fault protection devices complying with electrical winding polarities indicated. Set field-adjustable GFP devices and circuit breakers for pickup and time-current sensitivity ranges as indicated, subsequent to installation of devices and CB's.

PART 2 - PRODUCTS: REFER TO APPLICABLE DIVISION 26 SECTIONS.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate with other electrical work, including utility company wiring, as necessary to interface installation of service entrance equipment work with other work. Provide service entrance conduits with sweep L's. Properly seal conduits, immediately upon installation, to prevent water, moisture, dirt, rodents, insects, etc. from entering ducts.
- B. Prior to commencing with any service entrance related work, carefully coordinate installation of service work with affected utility companies, with Owner's Representative, with other trades, with affected entities, and with authorities having jurisdiction.
- C. Provide tight system and equipment grounding and bonding connections for service-entrance equipment, and wiring.

END OF SECTION 262116.00

SECTION 262416.00 - PANELBOARDS**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS****A. Product Data**

1. For each provide bus configuration, current ratings, voltage ratings, SCCR Ratings, overcurrent protective device(s), surge suppression device(s), accessory, and components indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

PART 2 - PRODUCTS**2.1 GENERAL REQUIREMENTS FOR PANELBOARDS****A. Manufacturers:** Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit
2. GE/ABB
3. Siemens Industry, Inc.
4. Square D; a brand of Schneider Electric
5. Mersen
6. Littelfuse

B. Enclosures: Refer to electrical drawings and coordinate with field conditions for cabinet mounting types (i.e. flush, surface, flush and surface).

1. Rate for environmental conditions at installed location.
2. Front Cover: Entire front trim hinged to box, and with standard door within hinged trim cover. Provide dead front behind standard trim door, bolted in place, to cover bare wiring, lugs, bussing and terminal bars. Provide concealed hinges. Provide concealed hinges, secured with flush latch with tumbler lock and keyed alike.
3. Provide additional features where indicated on drawings or needed due to field or architectural conditions. Such features include, but are not limited to, the following.
 - a. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
 - b. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
4. Panel and Trim Finish: Galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
5. Back Box Finish: Galvanized steel
6. Directory Card: Provide neatly typewritten circuit directory card for each panelboard upon completion of installation work. Include the actual room names/numbers that are selected for interior signage/designation.

C. Barriers: Around any energized phase busbar or terminal supplied from a feeder tap, transformer, or service entrance conductors.

- D. Incoming Mains Location: Provide incoming main locations (top or bottom, or top and bottom) based on means and methods and conduit/raceway layouts that are planned for installation.
- E. Phase, Neutral, and Ground Buses: Refer to electrical drawings, single line diagram and schedules for additional information on requirements for buses, as applicable.
 - 1. Material: As shown on drawings. Where copper is specified, provide silver or tin plating.
 - 2. Grounded ("Neutral") Bus: Provide 100% rated bus with sufficient lugs to accommodate grounded conductors for all circuits and pole spaces.
 - 3. Equipment Grounding Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box; minimum 50 percent rated. Bond to grounded ("neutral") bus for service entrance applications only.
 - 4. Extra-Capacity Neutral Bus: Refer to single line diagram and schedules.
- F. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Tin-plated aluminum
 - 1. Main and Neutral Lugs: Mechanical type.
 - 2. Ground Lugs and Bus-Configured Terminators: Mechanical type.
 - 3. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
 - 4. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
 - 5. Gutter-Tap Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
 - 6. Extra-Capacity Neutral Lugs: Where 200 percent rated bussing is called for on single line diagram; provide 200 percent rating of phase lugs mounted on extra-capacity neutral bus.
- G. Service Equipment Label: NRTL/ULSE labeled for use as service equipment for units with one or more main service disconnecting and overcurrent protective devices.
- H. Future Devices: Provide all mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- I. Fault Current Ratings
 - 1. Provide electrical distribution related equipment with appropriately braced bussing and properly rated breakers, fuses, etc. for the available fault currents.
 - 2. Unless directed otherwise on drawings, in existing buildings where fault current values are not indicated on drawings, coordinate with existing "upstream" distribution equipment, and provide equipment AIC ratings that meet or exceed same.
- J. Provide panelboard branches as scheduled on the drawings. Provide circuit breaker panelboard bus assemblies with distributed (sequence) type bussing throughout, so that any two adjacent single-pole breakers, or spaces, are replaceable by a two-pole internal common trip breaker, and so that any three adjacent single-pole breakers, or spaces, are replaceable by a three-pole internal common trip breaker. This applies for branch breakers sized 15-amp through 70-amp inclusive, without disturbing any other breaker.
- K. Provide dead-front safety type panelboards as indicated, with panelboard switching and protective devices in quantities, ratings, types, and with arrangement shown. Provide with lug connectors approved for use with copper or aluminum or copper-clad aluminum conductors. Provide lugs, lug kits and related accessory work as required to accommodate the conductor sizes and quantities needed for each application. Coordinate with single-line diagram, schedules, field conditions, etc.
- L. Provide integral factory-installed power supply system(s) to prevent electronic-trip breakers from tripping under conditions where load current may at any time fall below operational thresholds. Provide factory-wired power supply system(s), powered from the respective panelboard with

integral overcurrent protection, control power transformer(s), etc. as necessary for complete operational system(s) without requiring any external or field wiring.

2.2 PANELBOARDS

- A. Provide Distribution Panel construction for panelboard applications where indicated on drawings or where otherwise required based on power distribution requirements. Provide Panelboard construction for branch panelboards.
- B. Provide circuit breaker panelboards unless indicated otherwise on drawings.
 - 1. Circuit Breaker Branch Overcurrent Protective Devices: Bolt-on type, replaceable without disturbing adjacent units.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breakers (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. 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.
 - 2. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
 - 3. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
 - 4. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
 - 5. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
 - d. Shunt Trip: Trip coil voltage as required to achieve intended control scheme with coil clearing contacts (or equivalent configuration), energized from separate circuit
 - e. Mounting: Designed to be mounted and operated in any physical position, and to be operated in a minimum ambient temperature of 40 degrees C.; with mechanical screw type removable connector lugs, AL/CU rated.
 - f. Size: Full size, no "tandem" or "split" breakers.
 - g. Position: All load-side box lugs of each breaker in the same gutter.
 - h. Common Trip: Common trip for multi-pole breakers so overload on one pole will trip all poles simultaneously. Provide multi-pole breakers with common trip (or with handle-ties, only if needed because breakers are existing) for applications where it is determined that a common disconnecting means is required for multi-wire branch circuits serving, or within, the same enclosure, outlet box, equipment, or device.
 - i. SWD Type: Provide for 15 and 20 ampere branch circuit breakers (UL Listed).
 - j. HACR Type: Provide for 15 through 70 ampere branch circuit breakers.
 - k. Spares: Place all spare circuit breakers in the 'OFF' position, provide with breaker locks, and schedule them as "Spare" on directory card.

2.4 ACCESSORY COMPONENTS AND FEATURES

- A. Provide panelboard accessories and devices including, but not necessarily limited to, overcurrent protection devices, ground-fault protection, etc., as recommended by panelboard manufacturer for ratings and applications indicated. Provide distribution equipment with ground bus bars. Provide a minimum of 20 handle, lock-on devices of the non-padlocking type for life safety, special systems and other essential circuits.
- B. Provide construction and bracing as required to permit shipping, rigging, etc. of products in any physical position or orientation without compromising product warranty.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Mount top of trim 90 inches above finished floor unless top-most breaker handle would end up being above 79 inches in which case the top of trim shall be mounted so that the top-most breaker handle will be below 79 inches. Install overcurrent protective devices and controllers not already factory installed. Set field-adjustable, circuit-breaker trip ranges and other applicable settings. Arrange conductors in gutters into groups. Install filler plates in unused spaces.
- B. Provide neatly computer-typed/printed circuit directory card for each panel upon completion of installation work. Include the actual room names/numbers that are selected for interior signage and/or designation. Scheduling shown on drawings is shown to indicate feeder and branch circuiting requirements. Determine exact numbering sequence of circuits in field after performing final balancing.
- C. Provide electronic (solid state) circuit breakers where indicated on drawings or where required based on results of selective coordination study. Elsewhere electronic or thermal magnetic circuit breakers may be used, selected as required to accommodate project requirements.

END OF SECTION 262416.00

SECTION 262726.00 - WIRING DEVICES**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

- A. Product Data
 - 1. For each type include electrical characteristics, configurations, ratings, markings, colors, etc.

1.2 GENERAL

- A. Information regarding the following is included in other Division 26 specification sections and/or on drawings: weatherproof cover plates, special identification requirements, and occupancy sensors.
- B. Provide wiring devices, in types, characteristics, grades, colors, and electrical ratings for applications indicated which are UL listed and which comply with NEMA WD 1 and other applicable UL and NEMA standards. Verify color selections with Owner's Representative.
- C. Coordination: Receptacles for Owner-Furnished Equipment: Match plug configurations. Cord and Plug Sets: Match equipment requirements.
- D. Definitions:
 - 1. EMI: Electromagnetic interference.
 - 2. GFCI: Ground-fault circuit interrupter.
 - 3. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
 - 4. RFI: Radio-frequency interference.
 - 5. SPD: Surge protection device.
 - 6. Tamper-resistant: This term and "safety type" shall be taken to mean the same thing for receptacles.
- E. Maintenance Material Submittals: Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 - PRODUCTS**2.1 GENERAL**

- A. Acceptable Manufacturers: Subject to being equivalent and subject to compliance with requirements, provide product by one of the manufacturers listed below.
 - 1. Eaton Wiring Devices; Division of Eaton Industries, Inc. (Eaton)
 - 2. FSR Inc. (FSR)
 - 3. Hubbell Incorporated (Hubbell)
 - 4. Hubbell Incorporated; Wiring Device-Kellems (Hubbell)
 - 5. Hubbell Incorporated; Wiring Device-Bryant (Hubbell)
 - 6. Legrand
 - 7. Leviton Mfg. Company Inc. (Leviton)
 - 8. Lutron Electronics, Inc. (Lutron)

9. Pass & Seymour/Legrand (Pass & Seymour)
10. Wiremold/Legrand (Wiremold)

B. For receptacle circuits protected with 15A breakers, provide NEMA 5-15R equivalents for the devices specified in this section.

C. Provide equivalent quality devices by manufacturers listed in subparagraphs hereafter for cases where voltage, amperage and/or NEMA configurations that are indicated on drawings or, are otherwise required based on project conditions, differ from those specified herein.

D. Provide Weather-Resistant Receptacles with UL "WR" marking, compliant with NEC 406.8, for all applications in wet or damp locations.

E. Where GFI protected receptacles are shown on drawings, provide a separate GFI receptacle for each one shown. Do not feed downstream receptacles from load-side (GFI-protected) terminals of upstream receptacles.

F. Provide corrosion-resistant versions of receptacles specified below for industrial applications and applications in corrosive or potentially-corrosive environments.

G. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions: Connectors shall comply with UL 2459 and shall be made with stranding building wire; connectors are NRTL listed for intended use; connectors comply with the requirements in this Section; connectors are permitted by Authorities Having Jurisdiction.

2.2 SPECIFICATION GRADE RECEPTACLES

A. Convenience Receptacles: All 125V, 2-pole, 3-wire grounding, duplex receptacles shall be 20A, NEMA 5-20R and comply with applicable NEMA and UL requirements.

B. Convenience Receptacles, 125 V: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R (20A) or 5-15R (15A), UL 498, and FS W-C-596. Provide duplex and single specification grade receptacles, 2-pole, 3-wire grounding, self-grounding, green grounding screw, ground terminals and poles internally connected to mounting yoke, color coded base, 20-amperes, 125-volts, with metal plaster ears, back & side wiring, NEMA configuration 5-20R. Subject to compliance with requirements, provide one of the following (catalog numbers in subparagraphs below are for 20-A, heavy-duty, specification-grade, nylon-face devices; revise catalog numbers to require other configurations and ratings):

1. Eaton; 1877 (single), 817 (duplex)
2. Hubbell; HBL5351 (single), HBL5352 (duplex)
3. Bryant; 5351 (single), 5352A (duplex)
4. Leviton; 5351 (single), 5362 (duplex)
5. Pass & Seymour; 5351 (single), 5362 (duplex)

C. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596. Subject to compliance with requirements, provide one of the following:

1. Eaton; TRBR20
2. Hubbell; HBL8300
3. Bryant; 8300IL
4. Leviton; 5262
5. Pass & Seymour; TR63

D. GFCI Receptacles, 125V, 20A: Straight blade, feed-through or non-feed-through type depending on application. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection. Subject to compliance with requirements, provide one of the following:

1. Eaton; SGF20
2. Hubbell; GF20#LA
3. Bryant; GF20#LA
4. Pass & Seymour; 2097
5. Leviton; 6490

E. Tamper-Resistant GFCI Convenience Receptacles, 125 V, 20 A: Catalog numbers in list below are for feed-through types, arranged to protect receptacles downstream on the same circuit; revise catalog numbers if non-feed-through types are required. Subject to compliance with requirements, provide one of the following:

1. Hubbell; GFTR20
2. Bryant; GFTR20
3. Leviton; T7899
4. Pass & Seymour; 2097TR

F. SPD Receptacles:

1. General Description: Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 1449, and FS W-C-596, with integral SPD in line to ground, line to neutral, and neutral to ground.
 - a. SPD Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 V and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.
 - b. Active SPD Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."

2.3 TWIST-LOCKING RECEPTACLES

A. Comply with applicable requirements of NEMA and UL. Refer to drawings for configuration requirements. Subject to compliance with requirements, provide products by one of the following manufacturers:

1. Eaton
2. Hubbell
3. Bryant
4. Leviton
5. Pass & Seymour

2.4 CORD AND PLUG SETS

A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected; Rubber-insulated cord with stranded-copper conductors, Type SOW-A jacket, green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating; Nylon body plug with integral cable-clamping jaws (match cord and receptacle type for connection).

2.5 TOGGLE SWITCHES

A. General: Comply with NEMA WD 1, UL 20, and FS W-S-896

- B. Manufacturers: Obtain all devices from a single manufacturer. Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton
 - 2. Hubbell
 - 3. Leviton
 - 4. Legrand
 - 5. Lutron
- C. Switches: 120/277V, 20A, back and side wired, AC quiet type. Provide configurations as shown on the drawings.

2.6 COMMUNICATION, INFORMATION TECHNOLOGY AND SIMILAR OUTLETS

- A. Provide the following for communication, information technology and similar outlets that are shown on electrical drawings.
 - 1. Provide 4-inch square by minimum 2-1/8 inch deep outlet box with single-gang ring.
 - 2. Provide single-gang blank wall plate of material and color to match wiring devices in the respective room/area.
 - 3. Provide at least one 3/4" empty conduit from outlet box to accessible ceiling cavity, or to overhead joist/structure space in areas with no finished ceilings. Provide sweep bends and insulated throat fittings (or plastic bushings) at each end of the conduit
 - 4. Provide 200-pound pull string within conduits, easily accessible at both ends.
 - 5. Provide neat permanent marking at the end of the overhead stub that clearly states the purpose of the conduit and the room where the respective outlet is located.
 - 6. Coordinate all locations, heights and other specifics with the respective device/system installers and provide all work accordingly.

2.7 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices. Provide metal plate-securing screws with head color to match plate finish. Provide factory markings on faces of receptacles that are controlled for energy management or building automation that are compliant with Article 406.3(E), including symbol and the word "Controlled". Provide engraved wall plates where required by prevailing codes, indicated on drawings or indicated in Division 26 specifications.
 - 1. Material for Finished Spaces: satin finish stainless steel, equal to Leviton Type 430 series
 - 2. Material for Unfinished Spaces with surface-mounted outlet boxes: Galvanized steel
 - 3. Material for Indoor Damp Locations: Gasketed satin finish stainless steel, equal to Leviton Type 430 series, with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant. Refer to Section 26 05 33.00.

2.8 FLOOR OUTLETS

- A. Refer to "FLOOR OUTLET DEVICE SCHEDULE" on drawings for specifications for floor boxes.
- B. Products: Floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application. Comply with UL 514 and NFPA 70

scrub water exclusion requirements. Provide UL listed and labeled rating(s) for fire and smoke rating of floor (and ceiling-below where applicable) assembly.

C. General:

1. Do not scale floor outlet locations from drawings. Determine exact locations of each floor outlet, case by case, after consulting with Owner and Design Professionals, and after reviewing architectural documents so outlets are properly located to accommodate the final furniture and equipment layouts.
2. Set floor boxes so that the finished product is level and flush with finish flooring material.
3. Coordinate trims and cover plates to ensure compatibility with room finishes (i.e. height and color of carpet edging, special floor finishes, etc.).
4. Provide units designed and fabricated to accept standard strap-mounted devices and standard cover plates from any wiring device or telecommunication manufacturer.
5. Provide internal duplex receptacles, and communications plates, as required to accommodate services within. Provide blanks for unused outlet openings.
6. Provide blank brackets for unused outlet openings.
7. Provide shallow units for shallow pour applications (only); verify in field.
8. Power Receptacle(s): NEMA WD 6 Configuration 5-20R, unless indicated otherwise.
9. Voice and Data Communication Outlets: Meet with telecommunication system installers before making final box-by-box catalog number selections for the internal mounting bracket assemblies for floor outlets to ensure compatibility with outlet functions. Provide factory-installed barriers between power and telecommunication cells.
10. Provide cast iron units for slab on grade applications, with internal compartment dividers. If cast iron units are not available, provide pour pan accessory and install slab-on-grade applications as directed by manufacturer; provide suitable physical separation with a pour pan accessory below the leveling feet of the enclosure to prevent contact with grade, or other pre-approved method.
11. Provide steel units for floors above grade, with internal compartment dividers.

2.9 FINISHES AND INDICATORS

- A. Device Color (unless otherwise indicated or required by NFPA 70 or device listing):
 1. General Wiring Devices Connected to Normal-Utility Branch of Power System: Ivory.
- B. Wall Plate Color: For plastic covers, match device color.
- C. Illuminated Indication: Provide illuminated face or indicator light versions of wiring devices specified herein where indicated as such on drawings and/or where required by prevailing code(s), to indicate that there is power to the device.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordination with Other Trades: Protect installed devices and their boxes. 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 boxes. 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. 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. Install wiring devices after all wall preparation, including painting, is complete.

B. Conductors: Provide grounded ("neutral") conductor in all lighting control device (switch, dimmer, occupancy sensor, etc.) wall outlet boxes, even if not immediately used. Do not strip insulation from conductors until right before they are spliced or terminated on devices. 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. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtailed. Existing Conductors: Cut back and pigtail, or replace all damaged conductors; Straighten conductors that remain and remove corrosion and foreign matter; Pigtailing existing conductors is permitted, provided the outlet box is large enough.

C. Device Installation:

1. Replace devices that have been in temporary use during construction and that 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 pigtailed 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, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtailed 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. Install wiring devices only in electrical boxes that are clean; free from building materials, dirt, and debris. Install wiring devices after wiring work is completed. Install wall plates only after respective wall surfaces have received their final finish.
11. Consider locations indicated on the drawings to be approximate (unless specifically dimensioned on drawings, or unless spacings must comply with prevailing codes). Study the general construction with relation to spaces and equipment surrounding each outlet.
12. Do not use aluminum products in concrete.
13. Fasten electrical boxes firmly and rigidly to substrates, or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry. Support boxes independent of conduit.
14. Provide feed-through-type GFCI receptacles where downstream receptacles are fed from the line side of the GFCI receptacle.
15. Adjust locations of outlets, devices, etc. to suit arrangement of partitions and furnishings.
16. 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, multigang wall plates
17. Receptacle Orientation: Install receptacles so that the ground pin is oriented in a consistent manner throughout the facility, so that the orientation is compliant with all prevailing codes and regulations, and so that the orientation is acceptable to the electrical inspector. Where there is no existing building standard or other project requirement, install receptacles with ground pin up. Where receptacles are installed horizontally, install so that neutral connection faces up. Coordinate with AHJ and Owner.
18. Device Plates: 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.

3.2 FIELD QUALITY CONTROL

A. Tests for Receptacles:

1. Line Voltage (120V): Acceptable range is 105 to 132 V.
2. Test for correct polarity and grounding.
3. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
4. Ground Impedance: Values of up to 2 ohms are acceptable.
5. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
6. Using the test plug, verify that the device and its outlet box are securely mounted.
7. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

B. Installed equipment will be considered defective if it does not pass tests and inspections. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest. Prepare test and inspection reports. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262726.00

SECTION 262813.00 - FUSES

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

- A. Product Data
 - 1. For each type include fuse characteristics, trip curves, ratings, size, ambient temperature adjustment information, etc.

1.2 EXTRA MATERIALS

- A. Fuses: Furnish fuses equal to 10% of project quantity not exceeding (10) for each fuse size and type. Furnish no fewer than (2) for single phase applications and (3) for three phase applications.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work:
 - 1. Cooper Bussmann, Inc.
 - 2. Edison Fuse, Inc.
 - 3. Mersen, Inc.
 - 4. Littelfuse, Inc.

2.2 GENERAL REQUIREMENTS

- A. Characteristics:
 - 1. 50 through 60 Hz., with 200,000 RMS symmetrical interrupting current rating.
 - 2. Voltage: Rate based on voltage of protected feeders, circuits and loads.
 - 3. Provide rejection type fuses for fuses 1 ampere through 600 amperes.
 - 4. Provide Hi-Cap, bolt type fuses for fuses 601 amperes through 6000 amperes.
 - 5. Cartridge Fuses: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.
 - 6. Provide each fuse with clear factory markings indicating classification, characteristics, ampere ratings, voltage ratings, etc.

PART 3 - EXECUTION

3.1 FUSE APPLICATIONS

- A. For protecting service entrances, and distribution feeders 600 amperes and below: Provide UL Class RK-1 Current-Limiting/Time-Delay fuses. Provide fuses that are current-limiting, time-delay, dual-element type (with pure silver links), equal to Bussman #LPS-RK1 (600V) or Bussman #LPN-RK-1 (250V) as applicable.

3.2 INSTALLATION

- A. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse. Provide fuses as required to render related electrical, and electrically operated, equipment fully operational. Do not ship fuses installed in switches. Do not install fuses in equipment until wiring and equipment is ready to be energized, and until fuse sizes have been field-coordinated with wiring and equipment being protected. Field verify recommended fuse size and type from respective equipment installer and/or manufacturer prior to installing fuses for protection of specific equipment, motors, etc. Contact Design Professional if a conflict in fuse size or type arises between manufacturer's recommendations and above specifications.
- C. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813.00

SECTION 262816.13 - ENCLOSED CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

A. Product Data

1. For each type include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes. Include current ratings, voltage ratings, short circuit current ratings, accessories, breaker features, trip unit information as appropriate, etc.

PART 2 - PRODUCTS

2.1 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. Refer to drawings for NEMA type. Provide the following enclosure types if not noted on drawings.

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: Type 3R.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

2.2 ACCESSORY COMPONENTS AND FEATURES

A. Provide construction and bracing as required to permit shipping, rigging, etc. of products in any physical position or orientation without compromising product warranty.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install individual wall-mounted units with tops at uniform height unless otherwise indicated, or unless units must be stacked vertically, or unless field conditions otherwise dictate. Where applicable, install enclosed circuit breakers that function as a local disconnecting means within sight of controller position unless otherwise indicated. Size units according to load being served or as noted on drawings, whichever frame size requirement is larger. Provide units with horsepower ratings suitable to the loads where applicable. Install overcurrent protection and accessories as necessary to fulfill requirements of each application as applicable.

END OF SECTION 262816.13

SECTION 264313.00 - SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS**

- A. Product Data
 - 1. For each type include rated capacities, operating characteristics, electrical characteristics, maximum continuous operating voltage, weights and dimensions, wiring requirements, tested values, required OCPD and accessories, warranty, etc.

1.2 RELATED DOCUMENTS

- A. See Section 26 27 26.00 "Wiring Devices" for surge protection receptacles if applicable.

1.3 DEFINITIONS:

- A. SPD: Surge protective/protection device.
- B. SPD Type: Used to describe the intended application location of the SPD, either upstream or downstream of the main overcurrent protective device of the facility.
 - 1. Type 1 SPD – Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service equipment overcurrent device, as well as the load side, including watt-hour meter socket enclosures and intended to be installed without an external overcurrent protective device.
 - 2. Type 2 SPD – Permanently connected SPDs intended for installation on the load side of the service equipment overcurrent device; including SPDs located at a branch panel.
 - 3. Type 4 SPD – Recognized Component SPDs, including discrete components as well as component assemblies, which bear specific conditions of acceptability.
- C. Enhanced EMI/RFI Filtering: Voltage independent, dedicated circuitry intended to mitigate the effects of switching or ringing surges that is specifically designed so that it can survive the surge environment. The performance of filtering circuitry is defined by the level to which it mitigates Ring Wave transients and can be demonstrated in the test results of IEEE C62.41.2-2002, Category A Ring Wave (2kV).
- D. VPR (Voltage Protection Rating): A rating selected from a list of preferred values as detailed in the latest edition of UL 1449 and assigned to each mode of protection. The value of VPR is determined as the nearest highest value taken from a list of preferred values as detailed in the latest edition of UL 1449 to the measured limiting voltage determined during the transient-voltage surge suppression test using the combination wave generator at a setting of 6 kV, 3 kA.
- E. MCOV (Maximum Continuous Operating Voltage): The maximum designated root mean-square (rms) value of the power frequency voltage that may be continuously applied to the mode of protection of an SPD.
- F. Nominal Discharge Current (In): Peak value of the current, selected by the manufacturer from a list of values specified in the latest edition of UL 1449, through the SPD having a current wave shape of 8/20 where the SPD remains functional after 15 surges using the test procedure described in the latest edition of UL 1449.

- G. Modes of Protection: Electrical paths where the SPD offers defense against transient over voltages. e.g. Each Line to Neutral (L-N), Line to Ground (L-G), Line to Line (L-L) and Neutral to Ground (N-G).
- H. Per Node Ratings: The rating of any individual SPD mode (L-N, L-G, L-L).
- I. Per Phase Ratings: The total surge current capacity connected to a given phase (Line to Neutral mode plus Line to Ground mode).
- J. MOV: Metal-oxide varistor; an electronic component with a significant non-ohmic current-voltage characteristic.

1.4 COORDINATION

- A. Coordinate location of field installed SPDs to allow adequate clearances for maintenance and proximity to electrical bus in protected power distribution equipment. SPDs shall be rated for the class and category of service necessary for the application.

1.5 MANUFACTURER'S WARRANTY

- A. Manufacturer agrees to repair or replace SPDs that fail in materials or workmanship within specified warranty period. Warranty Period: Minimum five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Provide all SPDs on this project by the same SPD manufacturer to ensure commonality and ease of Owner maintenance. Subject to compliance with requirements, provide product by one of the manufacturers listed below.
 - 1. Basis of Design:
 - a. Surge Suppression Incorporated
 - b. Emerson Surge Protection
 - c. Current Technology
 - 2. Advanced Protection Technologies Inc. (APT)
 - 3. ASCO Power Technologies (APT)
 - 4. Eaton Corporation
 - 5. GE/ABB
 - 6. LEA International
 - 7. Leviton Manufacturing Co., Inc.
 - 8. Siemens Industry, Inc.
 - 9. Square D

2.2 GENERAL SPD REQUIREMENTS

- A. SPD with Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application. Comply with latest editions of NFPA 70 and UL 1449.

2.3 SERVICE ENTRANCE SPD'S

- A. SPDs: Listed and labeled UL acceptable to authorities having jurisdiction as complying with UL 1449 Type 1. Comply with UL 1283.
- B. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 250 kA. This value shall be independently tested by a 3rd party testing agency.
- C. SPD shall have a Nominal Discharge Current Rating of 20 kA per mode for all modes. The Maximum Continuous Operating Voltage (MCOV) shall be at a minimum as follows:
 - 1. 120/208 Wye shall be 150V
- D. The SPD shall have Voltage Protection Ratings (VPRs) for modes shown above as follows:
 - 1. 120/208 Wye
 - a. L-N: 700V
 - b. L-L: 1,200V
 - c. L-G: 700V
 - d. N-G: 700V
- E. SPDs shall be or have the following features and accessories:
 - 1. Indicator light display for power to device and protection status.
 - 2. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status.
 - 3. Surge counter.
 - 4. Permanently-mounted, parallel connected.
 - 5. Solid-state clamping components to limit the surge voltage and divert the surge current. SPD components that "crowbar" (e.g. spark gaps, gas tubes, SCR's, etc.) are not allowed.
 - 6. Capable of sustaining 115% of nominal RMS voltage continuously without degrading.
 - 7. The SPD shall be tested and listed by an UL as a complete assembly to a symmetrical fault current rating greater than or equal to the available fault current at the location of installation at the protected power distribution equipment, in accordance with NEC Article 285 and shall be marked with the short circuit current rating (SCCR). If the available fault current is unknown, then the SCCR of the SPD shall be 200 kAIC.
 - 8. SPD system shall provide protection for all modes for a three-phase Wye-connected SPD.

2.4 ENCLOSURES

- A. Indoor Enclosures: NEMA 1 or better; Outdoor Enclosures: NEMA 4 or better.
- B. Wire SPDs to a disconnecting switch or breaker, rated for minimum 30 amps (higher if/as recommended by equipment manufacturer), in the protected power distribution equipment per manufacturer's installation instructions to ensure a means of disconnecting the SPD from the power source without de-energizing the protected power distribution equipment or the connected loads. Size circuit breaker rating so that breaker does not open prematurely when removing surge suppression from the circuit. The use of direct bus bar connected SPDs is expressly prohibited and will be rejected unless integral means is included to disconnect and remove SPD without having to de-energize respective protected equipment or upstream equipment.
- C. New Power Distribution Equipment Other Than Service Entrance Equipment In Regularly-Occupied Finished Areas: Provide units fully integrated within equipment in separately-

barriered or equivalent compartments, connected to power distribution equipment within the equipment protected. Provide factory-installed integrated SPD units with collective assembly tested and UL Listed accordingly, and with the face of SPD unit (including LED's, integral switches, etc. as applicable) visible and accessible from inside the door but outside of the dead front; size enclosure heights accordingly.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install SPDs in strict accordance with manufacturer's instructions and the NEC. Comply with NECA 1.
- B. Externally Mounted Units and Similar Applicable Installations: Install SPDs with conductors between suppressor and points of attachment as short and straight as possible, and adjust circuit-breaker positions to achieve shortest and straightest leads. Do not splice and extend SPD leads unless specifically permitted by manufacturer in writing. In the case where the lead length exceeds 18 inches the installer must contact the SPD manufacturer for written installation assistance. Do not bond neutral and ground. Install conductors with direct paths to and from SPD devices avoiding sharp bends, loops and excessive lengths. Install externally mounted SPD components to the boxes of protected equipment as near as possible to the interior connection points; position or reposition the related branch breakers accordingly. Cut factory and field leads as required to minimize cable lengths for externally mounted units.
- C. Wiring:
 1. Install SPDs at service entrance on load side, with ground lead bonded to service entrance ground.
 2. Use crimped connectors and splices only. Wire nuts are unacceptable.
 3. Power Wiring: Comply with wiring methods in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
 4. Controls: Comply with wiring methods in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
 5. Provide overcurrent protection (OCP) compliant with NFPA 70 for each SPD. Such OCP's that may be shown on drawings are shown for schematic purposes. Provide OCP's at ratings as recommended by SPD manufacturer for each application.
- D. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests, and reconnect them immediately after the testing is over. Energize SPDs after power system has been energized, stabilized, and tested.

END OF SECTION 264313.00

SECTION 265100.00 - LIGHTING**PART 1 - GENERAL****1.1 SUBMITTAL REQUIREMENTS****A. Product Data**

1. For each type include detailed product information, light source, color temperature, color rendering index, lumen outputs, life, driver manufacturer, model and type, ceiling connection details, integral controls as applicable, drawings of custom fixtures or components, wiring diagrams, warranty, etc. Arrange luminaire submittals in booklet form with separate sheets for each luminaire, assembled by luminaire "type" in alphabetical order.

1.2 GENERAL

- A. Provide all labor, materials, equipment, equipment, programming, services, etc. as required for complete and fully operational lighting and lighting control systems.

B. Definitions:

1. CCT: Correlated color temperature.
2. CRI: Color-rendering index.
3. LER: Luminaire efficacy rating.
4. Lumen: Measured output of lighting source, luminaire, or both.
5. Luminaire: Complete lighting unit consisting of lighting source or sources, and some or all of the following components as applicable: optical control devices, contacts, mechanical components to support or attach the luminaire, and electrical and electronic components to start, operate, dim or control and maintain the operation of lighting source, and driving and transformation components.
6. Lighting Source: LED boards or equivalent LED assembly.
7. THD: Total harmonic distortion

1.3 QUALITY ASSURANCE

- A. Obtain equipment and components from single manufacturer for luminaires of the same type and "family" style. Drawings indicate dimensions for typical equipment configurations including clearances between equipment and adjacent surfaces and other items. Ensure product complies with the layouts indicated in the drawings. Provide Components, Devices, and Accessories that are listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period. Provide warranty period of at least five years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining years.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR LUMINAIRES AND COMPONENTS

- A. Products: Subject to compliance with requirements, provide products indicated on Drawings. Provide products of one of the manufacturers listed in this section for products that are not defined on the Luminaire Schedule. Provide specification grade luminaires that comply with minimum requirements as stated therein. If a particular "type" does not include basis of design manufacturer or model number, provide "pre-approved equivalent" manufacturer's and model numbers compliant with, and equivalent to: quality, performance, dimensions, and aesthetics as the respective basis of design for Design Professional review no less than five business days prior to bid due date.
- B. Luminaires designated by letters are defined as indicated on the Luminaire Schedule.
- C. Provide luminaires, of sizes, types and ratings indicated; complete with, but not limited to, housings, energy-efficient light sources, contacts, reflectors, wiring, etc. Ship luminaires factory-assembled, with components required for a complete operating installation.
- D. Recessed Luminaires:
 - 1. Comply with NEMA LE 4 for ceiling compatibility for recessed luminaires.
 - 2. Provide recessed luminaires with necessary gypsum board, plaster frames, and surface trim.
 - 3. Provide recessed luminaires that are constructed without rolled edges and that are post-painted.
 - 4. Provide door frames on troffer style luminaires with spring latches on door frames.
 - 5. Provide static air function for luminaires unless otherwise noted.
 - 6. Provide luminaires that are non-IC constructed unless otherwise noted.
 - 7. Provide junction boxes and serviceable components (driving and transformation component types, thermal protection devices, fuses, etc.) for recessed luminaires that are accessible for service and replacement from below the ceiling, without removing ceiling components.
 - 8. Where plaster frames are inferred for luminaires (either by narrative, or by catalog number, or by application) interpret the actual function to mean for mounting within gypsum board, wet plaster or similar type inaccessible ceiling system. Field verify related requirements and provide required accessories, such as frames, accordingly.
 - 9. Provide UL approved (listed and labeled) thermal protection per latest edition of NFPA/NEC for recess mounted luminaires.
- E. Surface Luminaires: Install surface mounted luminaires with air spaces between luminaire and surface per latest edition of NFPA/NEC. Provide factory luminaire wiring that is per NEC, #16 AWG minimum. Wire luminaires in accordance with the latest requirements of the National Electric Code.
- F. Review drawings and specifications of other trades to verify ceiling types, modules, and suspension systems appropriate to installation.
- G. Luminaires: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5, 5A, 5B, etc. as applicable.
- H. Metal Parts: Free of burrs and sharp corners and edges.
- I. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
- J. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit replacing lighting source(s) without use of tools.

Design to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during servicing and when secured in operating position. Fabricate luminaires with concealed hinges and catches, with metal parts grounded as common unit, and so constructed as to dampen generated noise.

- K. Diffusers and Globes: Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation, UV stabilized. Provide at least 0.125 inch minimum lens thickness unless otherwise indicated. Glass: Annealed crystal glass unless otherwise indicated.
- L. Factory-Applied Labels: Comply with UL 1598. Include recommended lighting sources, and driving and transformation components. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lighting sources are in place.
 - 1. Label shall include the following characteristics:
 - a. "USE ONLY" and include specific component type.
 - b. CCT and CRI for all luminaires.

2.2 EMERGENCY LED POWER UNIT

- A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body and compatible with light source driver(s)/board(s). Install remote from luminaire if so indicated on drawings, at accessible location and wired as directed by manufacturer. Comply with UL 924.
 - 1. Emergency Connection: Unless noted otherwise, operate light source continuously at full output. Connect unswitched circuit to battery-inverter unit and switched circuit, and/or control wiring as applicable, to luminaire.
 - 2. "Nightlight" Connection: Operate at full output continuously.
 - 3. Test Push Button and Indicator Light: Visible and accessible without opening luminaire 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: Pilot 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. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red pilot LED.
 - 7. Provide Bodine Cold-Pak series or approved equivalent. Provide with temperature-control circuitry to fulfill both low-temperature and high-temperature operation. Provide with high-temperature, maintenance-free nickel cadmium battery, charger, and electronic circuitry contained in one nominal 14" x 3" x 1-1/2" red metal case. Provide solid-state charging indicator light to monitor the charger and battery, a test switch, and installation hardware. Provide unit capable of operating luminaire at full light output in the emergency mode for a minimum of 90 minutes. Provide unit that is suitable for use in damp locations and suitable for use in sealed & gasketed luminaires. Provide unit with storage and operating temperature range for the B50Cold-Pak of -20 degrees C to +55 degrees C. Provide unit UL listed for installation inside, on top of, or remote from the luminaire. Provide unit with full five-year warranty from the date of purchase.

2.3 AUTOMATIC LOAD CONTROL RELAY DEVICE

- A. Provide automatic load control relay device manufactured by Bodine, Nine 24, Surelites, Lithonia, McPhilben, Side-Lite, or WattStopper by Legrand.
 - 1. Provide and wire unit to bypass electrical control devices when normal power fails and emergency power (via generator or inverter system) is needed for egress lighting - regardless of switching/control device on/off/dimmed position. Configure for automatic full-illumination of light source when in emergency mode.
 - 2. Provide device with the following components and features to comply with Article 700 of the National Electrical Code (NEC), UL 924 and UL 1008.
 - a. Provide fail-safe continuously monitored relay with 20 ampere contacts instantaneous or time delay electrically operated mechanically latched operation relays opens and closes emergency power with no possibility of current cross-over (NEC Sections 700.26, NFPA 110 4-2.4.1, 4-2.4.3).
 - b. Provide test switch to test under load.
 - c. Provide Indication LED's with red LED signal lamp that indicates luminaire is on emergency power and that indicates there is power connected to device.
 - d. Provide surge protection per NFPA 110 4-2.2 and A4-5.1.
 - 3. Provide enclosed emergency bypass relay that can be or is, as applicable, factory-installed in or on luminaire housing.
 - 4. Provide test switch and LED's that are visible.
 - 5. Interpret "fail-safe" to mean that emergency relay contacts go to mechanically latched position whenever normal power is interrupted or electronics of specified device fail.
 - 6. Provide both normal (sense) and emergency circuits to device even if both circuits are not specifically called out on floor plans.

2.4 EMERGENCY LIGHTING TRANSFER SWITCH DEVICE (BRANCH CIRCUIT 20A RATED)

- A. Provide emergency lighting transfer switch device manufactured by Bodine, Nine 24, Surelites, Lithonia, McPhilben, Side-Lite, or WattStopper by Legrand.
 - 1. Provide device that operates automatically on a continuous standby mode. Provide and wire unit to bypass electrical control devices when normal power fails and emergency power (via generator or inverter system) is needed for egress lighting - regardless of switching/control device on/off/dimmed position. Configure for automatic full-illumination of light source(s) when in emergency mode.
 - 2. Provide device that can be used to:
 - a. Automatically transfer a lighting load from normal power to emergency power (generator or inverter system) when normal power is lost.
 - b. Bypass switching/controls to provide emergency power to affected lighting loads when normal power is lost. Bypassing means and methods for controls shall prevent back-feed to allow lighting to energize at full brightness.
 - c. Bypass dimming and special controls using auxiliary relay contact(s).
 - 3. Provide device with the following components and features to comply with article 700 of the National Electrical Code (NEC) including 700.25, UL 1008 and UL 924.
 - a. Provide test switch to test under load (NEC 700.3(E); UL 924 Specification 29.1).
 - b. Provide Indication LED's with red LED signal lamp that indicates fixture is on emergency power and that indicates there is power (normal or emergency) connected to device (NEC 700-6a and 700-9a 2, 3).
 - c. Provide sign to read "Caution: two electrical power sources in this unit" per UL 924 and NEC 700.
 - d. Provide surge protection per NFPA 110 4-2.2 and A4-5.1.
 - 4. Provide with a minimum three dry form C contacts to allow use a wide variety of wiring options.
 - 5. Mounting for unit shall be surface mounted on wall or above ceiling. Provide with engraved laminate plaque indicating lighting to be controlled.
 - 6. Interpret "fail-safe" to mean that emergency relay contacts go to mechanically latched position whenever normal power is interrupted or electronics of specified device fail.

7. Provide both normal and emergency circuits to device even if both circuits are not specifically called out on floor plans.

2.5 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 1. Lighting Source for AC Operation: LEDs, 50,000 hours minimum rated life for lighting source.
 2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically energizes lighting source from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lighting source from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

2.6 EMERGENCY LIGHTING UNITS

- A. General Requirements for Emergency Lighting Units:
 1. Self-contained units complying with UL 924.
 2. Battery: Sealed, maintenance-free, lead-acid type.
 3. Charger: Fully automatic, solid-state type with sealed transfer relay.
 4. Operation: Relay automatically turns lighting source on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lighting source automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lighting source from battery, and battery is automatically recharged and floated on charger.
 5. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 6. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 7. Wire Guard: Heavy-chrome-plated wire guard protects entire assembly.

2.7 LIGHT EMITTING DIODE (LED) SYSTEMS

- A. Light Emitting Diode (LED) Systems
 1. LED Sources: Provide factory installed LED modules that are specifically designed for, and matched and mated to, the respective luminaire in which they are used. Provide LED modules that can easily be replaced in the field and are readily accessible for replacement. Provide color temperature as indicated in Luminaire Schedule.
 2. LED Drivers: Provide factory installed driver(s) for the LED source utilized that are specifically coordinated to the LED source and luminaire in which they are used. Provide driver(s) having specific operating characteristics defined in the Luminaire Schedule. Provide driver(s) that can easily be replaced in the field and are readily accessible for

replacement. Provide specification sheet for the specific driver as part of the Luminaires Submittal.

3. Total Harmonic Distortion (THD) Rating: Less than 20 percent. Provide factory-installed integral filtering system to ensure THD does not exceed 20 percent regardless of quantities and/or mixes with other manufactured LED systems.

2.8 LUMINAIRE SUPPORT COMPONENTS

- A. Support fixtures in compliance with NEC. Comply with Section 260529 "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single luminaire. Finish same as luminaire.
- C. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage.
- D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod. Hook Hangers: Integrated assembly matched to luminaire and line voltage and equipped with threaded attachment, cord, and locking-type plug.
- E. For open ceiling spaces where fixtures are suspended and subject to damage or impact, provide an additional air craft cable support securely fastened to luminaire and structure to act as a safety chain providing a redundant support. Select cable based on manufacturer's recommendations, accounting for weight of luminaire assembly, external forces that could be applied, minimum 200% factor of safety, etc. Decorative pendants in finished spaces are exempt from this requirement.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Luminaires: Set level, plumb, and square with ceilings and walls unless otherwise indicated. Install lighting sources in each luminaire.
- B. Temporary Lighting: If it is deemed necessary, and permitted by Owner's Representative and Design Professionals, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is substantially complete, remove the temporary luminaires, disassemble, clean thoroughly, install new LED boards, and reinstall.
- C. Remote Mounting of Driving and Transformation Components: Distance between the driving and transformation components and luminaire shall not exceed that recommended by the luminaire and driving and transformation components manufacturer. Verify, with manufacturers, maximum distance between driving and transformation components and luminaire.
- D. Lay-in Ceiling Luminaires Supports: Unless required otherwise under other sections or unless project requirements and conditions require otherwise, grid may be used as a support element, subject to coordinating installations with ceiling system installer to ensure the ceiling system

installer accounts for the weights of each luminaire and of all luminaires collectively, and installs specially marked and designated ceiling support components.

1. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each luminaire. Locate not more than 6 inches from luminaire corners.
2. **Support Clips:** Fasten to luminaires and to ceiling grid members at or near each luminaire corner with clips that are UL listed for the application.
3. **Luminaires of Sizes Less Than Ceiling Grid:** Install as indicated on reflected ceiling plans or center in acoustical panel, and support luminaires independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.

E. Suspended Luminaire Support:

1. **Pendants and Rods:** Where longer than 48 inches brace to limit swinging.
2. **Stem-Mounted, Single-Unit Luminaires:** 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 luminaire chassis, including one at each end.
4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.

F. Install surface and recessed ceiling luminaires on grid and tile ceilings to agree with module of ceiling either displacing a tile, or unit on center of tile, or centered on grid lines. Install flush mounted luminaires properly to eliminate light leakage between luminaire frame and finished surface.

G. Do not locate splice or tap within an arm, stem, or chain. Provide wiring continuous from splice in outlet box of the building wiring system to driving and transformation component terminals in luminaires.

H. Provide Type MC Cable or wiring in minimum 1/2" diameter flexible metal conduit (with full parity sized green insulated equipment ground wire) for "drops" from building wiring system junction boxes to suspended ceiling mounted luminaires. Limit the length of these "drops" to 72". Install "drops" to luminaires in gypsum board, and similar inaccessible ceiling systems, from identified accessible junction boxes.

I. Connect exit signage ahead of switching and other controls.

J. Provide luminaires and luminaire outlet boxes with hangers to properly support luminaire weight. Submit design of hangers, method of fastening, other than indicated or specified herein, for review by Owner's Representative and review by ceiling installer. Anchor luminaires installed in, or on, suspended ceiling systems in strict compliance with NEC, including advance coordination with the ceiling installer. Support surface mounted luminaires greater than 2 feet in length at a point in addition to the outlet box luminaire stud. Fasten electrical luminaires and brackets securely to structural supports. Install luminaires level and plumb.

K. Where special mounting conditions are encountered, such as mounting to rounded columns or similar special circumstances, provide special custom factory-fabricated mounting means (i.e., brackets designed to conform with curvature of rounded columns, or to conform with similar special surfaces).

L. Provide stems and chains for luminaires as designated by the Owner's Representative where deemed necessary by the Owner's Representative to achieve a functional and neat installation. Contact Owner's Representative to determine pendant, stem, and chain lengths if mounting height is not indicated.

- M. Provide plaster frames, or gypsum board frames, or similar kits for recessed luminaires installed in other than suspended grid type acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.
- N. Wear clean white cotton gloves when handling the luminaires reflective and diffusing surfaces. Clean surfaces including dust, finger prints, paint, etc. with a clean dry cheesecloth after interior work has been completed. Remove plastic shipping bags from luminaires only after work in the respective area is complete.
- O. Where applicable, verify that measured illuminance values comply with respective isolux (or equivalent) plot diagram values.
- P. Provide full assembly for luminaires that are shipped with any loose components, regardless of who furnishes the luminaires.
- Q. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to emergency source and retransfer to normal.
- R. Make adjustments and perform settings/programming to lighting controls/systems so that all luminaires are fully operational compliant with design requirements and to the satisfaction of the Owner and Design Professionals, and of requirements of authorities having jurisdiction.
- S. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark. Adjust aimable luminaires in the presence of Owner's Representative and Design Professionals.
- T. Train Owner's maintenance personnel to adjust, operate, clean, and maintain equipment, devices, controls, instrumentation, and accessories.

3.2 LIGHTING STANDARDS AND POST LIGHTS

- A. Utilize belt slings or rope (not chain or cable) to protect finishes of poles and standards when raising and setting finished poles and standards. Fasten electrical poles, luminaires and brackets securely to structural supports.
- B. Provide sufficient space encompassing hand access and cable entrance holes for installation of underground cabling where applicable. Separately-fuse luminaires within the pole-base handholes.
- C. Provide concrete base for each luminaire standard pole. Provide base that is reinforced, and, unless indicated deeper on drawings, of the depth recommended by the manufacturer. Provide galvanized steel washers, nuts and anchor bolts, in diameters, lengths and classes as directed by pole manufacturer. After ensuring that the poles are plumb, neatly fill the entire space between top of concrete bases and bottom of pole bases with grout. Provide poles with matching factory base covers ("skirts"). This applies even if not specifically indicated on Luminaire Schedule.

END OF SECTION 265100.00

SECTION 266001.00 - ELECTRICAL COORDINATION OF OTHER DIVISION EQUIPMENT

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

A. Product Data

1. Provide equipment electrical characteristic data for equipment specified under other divisions of this project for an electrical coordination review. Submit each type of equipment submittal as a separate submittal, for example: Pool Equipment, Kitchen Equipment, Gymnasium Equipment, Motorized Shades, etc. Each submittal should be labeled as 266001-PD-## where ## increments from 00 for each submittal.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 266001.00

SECTION 284621.25 - FIRE ALARM SYSTEM EXTENSION

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

- A. Product Data**
 - 1. For each type of devices including catalog numbers, electrical characteristics, ratings, color, temperature limitations, etc.
 - 2. Submit as separate submittal (PD) but at same time as Shop Drawings for this section.
- B. Shop Drawings**
 - 1. Provide a complete set of floor plan drawings showing conduit sizes and number of conductors required to all components plus detailed wiring connections required at each type of device. Clearly show the intended location of all field devices and their connections to the system. Include battery calculations, voltage drop calculations, critical dimensions, ductwork sizes for sampling tubes and associated required dimensions, wiring diagrams, sequence of operation, cable sizes and types, etc.
 - 2. Shop Drawings shall be prepared by persons with the following qualifications: Trained and certified by manufacturer in fire-alarm system design, and licensed and certified by authorities having jurisdiction.
 - 3. Submit as separate submittal (SD) but at same time as Product Data for this section.

1.2 EXTRA MATERIALS

- A. Audible and Visual Notification Appliances:** Furnish one of each type installed.
- B. Smoke Detectors:** Furnish 5% of new work quantity, minimum of one.
- C. Fuses:** Furnish two of each type installed in the system.

1.3 GENERAL REQUIREMENTS

- A.** Drawings and general provisions of the Contract, including General and Supplementary Conditions, and Division 01 Specification Sections, apply to this Section. Refer to Division 26 sections for requirements associated with all electrical work not specifically defined in this section, which shall be considered additional and concurrent scope of work that is associated with work of this section.
- B.** Apply for and pay all required permits and fees. Submit to AHJ and issue revisions to AHJ as required to keep AHJ documentation current. It shall be the responsibility of the Fire Alarm System Manufacturer to furnish submittals to the authority having jurisdiction for approval. This action shall be taken during the shop drawing procedure. The system must be approved by this authority and a copy submitted to the Engineer for review.
- C.** Provide all materials, labor and services to provide fully operational modifications to, and extensions of, existing facility fire alarm system(s). Provide minimum 25% spare capacity for each data loop, each alarm circuit and for each set of power supplies and batteries.

- D. Qualifications of system designers, installers, programming personnel, inspection personnel, testing personnel and maintenance personnel shall be trained and certified by manufacturer for installation of units required for this Project, and shall be qualified in compliance with requirements of NFPA, including Chapter 10.5 of NFPA 72.
- E. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated: Notify Owner's Representative no fewer than two days in advance of proposed interruption of fire-alarm service; Do not proceed with interruption of fire-alarm service without Owner's Representative's written permission.
- F. Sequencing and Scheduling: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building. After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

PART 2 - PRODUCTS

2.1 FIRE ALARM EXTENSION

- A. Connecting to Existing Equipment and System:
 - 1. Verify that existing fire-alarm system is operational before making changes or connections.
 - 2. Connect new equipment to existing control panel in existing part of the building.
 - 3. Connect new equipment to existing monitoring equipment at the supervising station.
 - 4. Expand, modify, and supplement existing control/monitoring equipment as necessary to extend existing control/monitoring functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.
 - 5. Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
 - 6. Initiating Device, Notification Appliance and Signaling Line Circuits: Class A or Class A and B (provide Class A for circuits that provide isolation module protection for zones).
 - 7. Provide Initiating Device, Notification Appliance, and Signaling Line Circuits that are NFPA 72, Class B, to match existing system.
- B. General Requirements:
 - 1. Provide materials and labor as required to result in a fully operational extension and modification to the existing fire alarm system.
 - 2. Where indicated on drawings, remove existing fire alarm devices in affected areas and protect during demolition and construction phases. Clean and reinstall these existing devices as indicated on drawings. Relocate devices as indicated on drawings and extend conduit and wiring as required. Modify and/or extend related existing wiring in conduit as required.
 - 3. Fire alarm system devices (smoke detectors, pull stations, A/V alarm indicating devices, etc.) shall be of the same manufacturer as, compatible with, and UL Listed and labeled for use on, the existing building fire alarm system.
 - 4. Provide auxiliary contacts if required for special applications. All strobe alarms shall be ADA compliant, minimum 75cd per ADA unless specifically indicated on drawings with lower candela rating.
 - 5. Install wall-mounted devices at the following heights above finished floor:
 - 1) Fire Alarm Manual Pull Stations: 46" to top of operating handle.

2) Fire Alarm Visual & A/V Annunciators: 80" to bottom of outlet box.

6. All new wiring shall be installed in strict accordance with manufacturer's requirements and installed in minimum 3/4" EMT conduit.
7. Fire alarm system wiring shall be installed in a raceway system separate from all other wiring, including security sub-system wiring where/if applicable.
8. Program detailed device and room descriptions so that any trouble, supervisory or alarm condition clearly announces floor level, room number, room name, device, and indication of normal, alarm, trouble and supervisory status at fire alarm control panel(s), at fire alarm annunciator panel(s) and at the supervising central station.
9. The installation shall include a complete system test of the equipment by the local representative of the system installed. This test shall be performed in the presence of representatives of the Owner, Engineer, and local fire department.
10. Provide all required modifications (cards, power supplies, hardware, firmware, software, etc.) to the existing Fire Alarm system as required to render the entire extension fully operable.
11. Provide ceiling mounted smoke detector located above each control/power units (all types, including those for associated systems), if not already existing, and above all remote annunciators.
12. Provide all power as required to energize all new fire alarm related components. This requirement applies whether or not such power work is shown on the drawings. Branch circuits serving fire alarm related equipment shall be dedicated to fire alarm related equipment only.
13. Provide documentation (hard-copy and digital) of fire alarm system documentation, and provide a single documentation cabinet at the main fire alarm control unit, all in compliance with NFPA 72, including Chapter 7.
14. Panic (duress) switches shall be Ademco #269 (configure wiring for use with the normally closed contacts for local looping). Mount below counter top as directed in field. Provide end-of-line resistor and separate 2 #14 home-run to the nearest existing transponder (verify in field).
15. Provide photoelectric type smoke detectors. Provide contact bases for all applications where auxiliary contacts are required. Smoke detector locations shall not exceed the rated coverage of the detector and, in general, shall be no more than 15 feet from a wall or 30 feet apart. Provide integral relay capable of providing a direct signal to elevator controller to initiate elevator recall and to circuit-breaker shunt-trip for power shutdown.
Placement Restrictions:
 - a. Locate detectors no closer than 3 feet horizontally from air-supply diffuser or return-air opening.
 - b. Locate detectors no closer than 12 inches from any part of a lighting fixture.
 - c. Locate detectors no closer than 3 feet horizontally from the tip of a ceiling fan blade.
 - d. Locate detectors no closer than 3 feet horizontally from the door or opening of a bathroom that contains a bathtub or shower, unless this would prevent placement of a detector that is required by prevailing codes.
 - e. Locate detectors closer than 6 feet horizontally from a permanently installed cooking appliance, unless this would prevent placement of a detector that is required by prevailing codes.
16. Provide STI #6520 protective cover for A/V alarm indicating devices in gymnasiums.
17. The waterflow switches, tamper switches and pressure switches shall be provided by the sprinkler contractor. The electrical contractor shall wire and provide the related monitor modules as required.
18. Provide power-limited cables that have a temperature rating of at least 60 degrees C; provide additional marking for conductor size and temperature ratings for cables rated in excess of 60°C (140°F).
19. Provide isolation modules as required to isolate wire to wire shorts on a data loop to limit the number of other modules or detectors that are incapacitated by the short circuit fault and/or grounds. Isolation modules shall be part of the smoke detector base. The

isolation modules shall permit the entire system to operate independently of the area disconnected by the isolation module due to wiring faults. Provide isolation modules and wiring configurations (using Class A, or Class A and B, pathways) for fault isolation so that any one fault will not cause any part of the system to go down other than the zone of the fault; provide zoning compliant with prevailing codes, including NFPA 72, with at least one zone per floor (more if areas are subdivided into multiple zones by fire and/or smoke barriers).

20. Provide monitor modules in quantities as required to interface all "non-intelligent" devices into the system. Application examples include fire alarm system remotes panels, remote power supplies, Sprinkler Flow Switches, Sprinkler Valve Tamper Switches, Sprinkler Valve Tamper Switches at Post Indicator Valves (PIVs), Sprinkler Valve Tamper Switches at meter pits, Fire Suppression/Protection System Pressure Switches, etc. as applicable. Refer to documents of all trades since some such devices may not be specifically shown on electrical drawings. Review fire suppression system submittals and installation drawings to determine exact quantities and locations for devices that require monitor modules, as project drawings may not include all devices that require monitoring; provide monitor modules, wiring, connections, programming, etc. accordingly.
21. Provide indoor monitor modules for applications where outdoor valves are being monitored. Field-verify locations for outdoor valves (meter pits, PIVs, etc.). Provide analog wiring in conduit from outdoor tamper switch to indoor monitor module.
22. Provide control modules for all auxiliary devices.

C. Duct Smoke Detectors

1. The intelligent addressable duct mounted smoke detectors shall be photoelectric smoke detector unit.
2. Provide sampling tube per NFPA, test station and all other required accessories.
3. Duct smoke detectors are typically shown schematically at the respective air handling unit on the plans, but shall actually be installed maximizing the distances between ductwork offsets, and installed ahead of the first branch duct take-off. Coordinate with HVAC Contractor and fire alarm manufacturer's representative in field. The duct smoke detectors shall be intelligent addressable photoelectric.
4. Detectors shall operate at air velocities of 300 to 4000 feet per minute.
5. Coordinate placement of duct detectors with the HVAC contractor.
6. The shut-down of the air handler shall be via control module, unless specifically forbidden by the AHJ, in which case provide auxiliary contact as required to shut down equipment and wire into the stop circuit of the associated air handler starter.
7. Install all duct smoke detectors in the return air duct/plenum of the respective air handling equipment, or in multiple locations of the return duct branches if necessary to meet the minimum straight distances that are required by manufacturer of smoke duct detectors. Refer to HVAC ductwork drawings, and to HVAC installer's coordination drawings, for configurations when determining actual locations and quantities of duct smoke detectors. Where more than one detector is already indicated associated with a particular piece of air handling equipment, there are special reasons for the additional detectors (i.e. split returns, return risers serving multiple floors, etc.); coordinate all locations for same with the HVAC installer.
8. In cases where multiple HVAC units serve a common space, provide interlocking functionality so that activation of any one duct smoke detector (or spot smoke detector where applicable) provides shutdown functions for all HVAC units that collectively serve the affected space.
9. In cases where plenum-return methods are utilized for HVAC return-air, provide smoke detector suspended in the air stream near the entrance to the return-air intake to the HVAC unit(s). Install using materials, means and methods pre-approved by authority or authorities having jurisdiction.
10. Provide keyed test/monitor station (with status/alarm/trouble indicating LED's) on the ceiling or wall (flush in finished areas) beneath the duct detector at discreet but readily visible location as determined in field unless specific location is shown on drawings.

Provide engraved (or approved equivalent method) plate at each remote station to read: "#### Duct Smoke Detector", where #### is the equipment identification used on drawings. Connect to fire alarm system.

11. If required by authority having jurisdiction, provide identified key-operated air handler reset station on the ceiling or wall (flush in finished areas) beneath the air handler at discreet but readily visible location as determined in field unless specific location is shown on drawings. Provide engraved (or approved equivalent method) plate at each reset station to read: "#### Reset Switch to reset #### after a duct smoke detection event has been cleared and the fire alarm system has been reset.", where #### is the equipment identification used on drawings. Coordinate with authority having jurisdiction for verification of, or required modification to, the language to be engraved. Connect to fire alarm system.
12. Provide all required power and control wiring so that upon detection of smoke, the following sequence of operations occurs where applicable.
 - a. Report as alarm or supervisory signal to the fire alarm system and monitoring central station based on prevailing codes and direction from AHJ (verify in field with AHJ), and A/V alarm annunciates at the remote test station.
 - b. The HVAC unit shuts down (including applicable dampers).
 - c. Associated smoke dampers close (wired to automatically re-open on duct detector reset).

D. Smoke Dampers and Fire/Smoke Dampers

1. Provide all related power and control wiring. Provide control module(s) (and relay(s) if necessary) to provide wired/programmed control of the damper(s).
 - a. Furnish and wire all smoke detectors associated with dampers. Detectors in ductwork shall be installed by Division 23 contractor. All others shall be installed by Division 28 contractor.
 - b. Where a damper is installed within a duct, provide duct smoke detector within five feet of the damper with no air outlets or inlets between the detector and the damper.
 - c. In cases where a duct smoke detector is not practical due to position or post-construction access, a smoke detector may be provided inside the duct instead of a duct detector, with no air outlets or inlets between the detector and the damper.
 - d. In cases where ductwork is open to a plenum or similar application, smoke detectors may be provided instead of a duct detector if a duct smoke detector is not practical due to position or post-construction access. Install within 12 inches of the opening and provide in quantities and spacing as required to comply with Part A.17.7.5.4.2.2 of NFPA 72 (one detector centered in opening for up to 36-inch wide duct, 2 detectors at one-quarter points of the opening for ducts between 36 and 72 inches wide, and one additional detector for each full 24 inches of opening beyond 72 inches wide).
 - e. Quantities and types of detectors that may be indicated on drawings are for functional representation only. Provide types and quantities as needed to comply with device specifications, means and methods, and with prevailing codes and ordinances.
 - f. Provide detectors that are listed for the respective air velocities, temperatures and humidity anticipated at the point where it is installed.
 - g. Install smoke detection in strict compliance with all prevailing codes and regulations, including Parts 17.7.5.4 and 17.7.5.5 of NFPA 72.
 - h. Where a damper is installed above smoke barrier doors in a smoke barrier, provide one ceiling smoke detector (listed for releasing service) on each side of the respective smoke barrier door opening.
 - i. Where a damper is installed within an unducted opening in a wall, provide one ceiling smoke detector (listed for releasing service) on each side of the respective damper, within five feet horizontally of the damper.

j. Provide all required power/control modules, wiring and programming so that, upon detection of smoke by any of the smoke detectors related to the respective damper, the following sequence of operations occurs as applicable:

- 1) Damper automatically closes.
- 2) Related HVAC unit shuts down.
- 3) Alarm signal is sent to the fire alarm control unit and to the monitoring central station. (Where duct smoke detectors are used, program to report as an alarm signal or as a supervisory signal, based on prevailing codes and direction from AHJ – verify with AHJ in field).
- 4) Damper automatically resets (opens) upon successful reset of the fire alarm system after the initiating condition has been cleared.

PART 3 - EXECUTION

3.1 EXECUTION

- A. Refer to "PRODUCTS" sub-section above.
- B. Properly identify system components, wiring, cabling, and terminals. Install framed instructions in a location visible from fire-alarm control unit. Provide red color on jacket of all fire alarm cables associated with the fire alarm system. Provide red-colored breaker handle and red-colored lock-on device at source circuit breakers that feed fire alarm related equipment. Provide red coloring for all fire alarm system junction boxes, along with system identification.
- C. Provide ceiling mounted smoke detector located above each control/power unit (all types, including those for associated systems), and above all remote annunciators. Provide weatherproof audible alarm notification device on the exterior wall at the location where the fire suppression sprinkler system water service enters the building.

3.2 PERFORMANCE

- A. The following table shows the schematic sequence of operations for the Fire Alarm System.
- B. Sequence of Operation Notes:

FIRE ALARM SYSTEM SCHEMATIC SEQUENCE OF OPERATIONS														
		Activate A/V annunciate of all event alarm/trouble signals at FACU and at remote annunciator(s) and transmit to History Log.												
Initiation Device		Event	Notify FACU and FARA	Activate A/V Alarm Devices	Notify Central Station	Shut Down Assoc.	Eqt.	Shut Down Elev.	Activate Phase ½ Fireman	Activate Exh. Hood Fire Alarm Sequence	Activate Smoke Control / HVAC Sact	Activate Door Releases	Activate Water Flow	Notes
Manual Pull Station	Alarm	X	X	X	X						X		9	
	Trouble	X		X							X			
Ceiling Smoke/Heat Detector	Alarm	X	X	X	X						X		9	
	Trouble	X		X										
Sprinkler Flow Switch	Alarm	X	X	X	X					X	X	X	5,9	
	Trouble	X		X										

Sprinkler Tamper Switch	Suprvs.	X		X								
	Trouble	X		X								
Low-Air Pressure of Dry Pipe Sprinkler System	Suprvs.	X		X								
	Trouble	X		X								
Smoke Detectors Assoc. with Mech. Eqt.	Alarm	X	See Note 1	X	X					X		1
	Trouble	X		X								
Duct Smoke Detectors	Trouble	X		X								
	Alarm	X	See Note 1	X	X					X		1
Duct Smoke Detectors Smoke Detector Open to Atrium	Trouble	X		X								
	Alarm	X	X	X	X					X	X	5,9
Smoke Detector Open to Atrium	Trouble	X		X								
	Alarm	X	X	X	X					X	X	5,9
Manual Controls for Smoke Control/ Evac.	Trouble	X		X								
	Alarm									X		5
Manual Controls for Smoke Control/ Evac.	Trouble											
	Alarm	X	X	X	X					X		6,9

Sequence of Operation Notes:

1. Program to report as an alarm signal or as a supervisory signal, based on prevailing codes and direction from AHJ – verify with AHJ in field)

END OF SECTION 284621.25