

**CITY OF VINELAND
VINELAND, NEW JERSEY**

SPECIFICATIONS

FOR

CITY OF VINELAND MUNICIPAL COURT RENOVATIONS

COV BID # 2025-32 (RE-BID)

BID OPENING: THURSDAY, NOVEMBER 20, 2025
PREVAILING TIME: 2:00 PM

**DEPARTMENT OF FINANCE
DIVISION OF PURCHASING
640 E WOOD STREET
P.O. BOX 1508
VINELAND, NJ 08362-1508**

**Miguel A. Mercado, QPA
Purchasing Agent
(856) 794-4040 Phone
(856) 405-4605 Facsimile
jmeneghetti@vinelandcity.org**



640 E. WOOD STREET
P.O. BOX 1508
VINELAND, NJ 08362-1508

DEPARTMENT OF FINANCE
DIVISION OF PURCHASING
MIGUEL A. MERCADO, QPA
PURCHASING AGENT

PHONE: (856) 794-4040
FAX: (856) 405-4605

NOTICE TO BIDDERS

Sealed bids will be received by the Purchasing Agent of the City of Vineland on Thursday, November 20, 2025, at 2:00 p.m. prevailing time in the Purchasing Department, 5th Fl., City Hall, 640 E. Wood Street, Vineland, New Jersey 08360, at which time and place, bids will be opened and read in public for the furnishing of:

COV BID 2025-32 (RE-BID) CITY OF VINELAND MUNICIPAL COURT RENOVATIONS

The bid must be submitted in **duplicate** and shall be enclosed in an opaque sealed envelope, addressed to "Division of Purchasing, City of Vineland, 640 E. Wood Street, PO Box 1508, Vineland, NJ 08362-1508"

Bidders shall comply with the requirements of N.J.S.A. 10:5-31 and N.J.A.C. 17-27 et seq.

You must submit paper documents as your bid package. We cannot accept electronic copies. The documents to be submitted start with the Checklist. **(PLEASE DO NOT SUBMIT THE SPECIFICATIONS WITH YOUR BID PACKAGE.)** Original signatures must be in one document (Please use [blue](#) ink for the signatures). The duplicate can be a photocopy.

If you have any questions, please contact the Purchasing Agent at the above number or email PurchasingOffice@vinelandcity.org

DO NOT STAPLE DOCUMENTS
NO DOUBLE-SIDED COPIES

**CITY OF VINELAND
GENERAL INSTRUCTIONS
(CONSTRUCTION)**

I. SUBMISSION OF BIDS

- A. Sealed bids shall be received in accordance with public advertisement as required by law, with a copy of said notice being attached hereto and made a part of these specifications.
- B. Each bid shall be submitted on the proposal form attached and shall be submitted in a clearly marked sealed envelope addressed to:

If delivered:

**DIVISION OF PURCHASING
640 E. WOOD STREET
5TH FLOOR
VINELAND NJ 08360**

If mailed:

**DIVISION OF PURCHASING
640 E. WOOD STREET 5TH FL
PO BOX 1508
VINELAND NJ 08362-1508**

* Do not use PO Box on Overnight Delivery Services, i.e. (Fed-Ex)

Bidder's name, address, bid category, and due date must appear on the outside of the BID ENVELOPE containing the bid.

- C. Sealed bids will be received by the Purchasing Agent or designated representative, at the time and location as stated in the Notice to Bidders, and at such time and place will be publicly opened and read aloud.
- D. It is the bidder's responsibility to see that bids are presented to the Purchasing Agent on the hour **and at the place designated. Bids may be hand delivered or mailed; however, the City disclaims any** responsibility for bids forwarded by regular or express mail. If the bid is sent by express mail service, the designation in sub-section B, above, must also appear on the outside of the express mail envelope. Bids received after the designated time and date will be returned unopened. The City of Vineland shall not be responsible for late postal or overnight delivery, nor shall postmark dates or overnight dates be considered in honoring of bids. The City of Vineland shall not be responsible for bidder's hand delivering bids who arrive late or to the wrong location.
- E. Sealed bids forwarded to the City before the time of opening of bids may be withdrawn upon written application of the bidder who shall be required to produce evidence showing that the individual is or represents the principal or principals involved in the bid. Once bids have been opened, they shall remain firm for a period of sixty (60) calendar days.
- F. All prices and amounts must be written in ink or preferably machine-printed. Bids containing any conditions, omissions, unexplained erasures or alterations, items not called for in the bid proposal form, attachment of additive information not required by the specifications, or irregularities of any kind, may be rejected by the City. Any changes, whiteouts, strikeouts, etc. in the bid must be initialed in ink by the person signing the bid.

- G. Bids will be received only on the bidding forms attached to this specification or a true copy thereof with all notations to be done in ink or typed and signatures must be done in ink. **ONLY ORIGINAL SIGNATURES ON ALL DOCUMENTS WILL BE ACCEPTED. RUBBER STAMPS, COMPUTER GENERATED SIGNATURES, COPIER GENERATED SIGNATURES, OR ANY OTHER ARTIFICIAL SIGNATURES SHALL NOT BE ACCEPTABLE AND SHALL BE REASON FOR REJECTION.** City of Vineland will not be held responsible for any erroneous pages or pages missing from this bid document if it is obtained from a source other than the Purchasing Department of the City of Vineland. City of Vineland will not be held responsible if bidders (vendors) fail to receive any updates or addenda to the specification, if they haven't contacted the Purchasing Department.
- H. Each bid proposal form must give the full business address, business phone, fax, the contact person of the bidder, and be signed by an authorized representative as follows:
- Bids by partnerships must furnish the full name of all partners and must be signed in the partnership name by one of the members of the partnership or by an authorized representative, followed by the signature and designation of the person signing.
 - Bids by corporations must be signed in the legal name of the corporation, followed by the name of the State in which incorporated and must contain the signature and designation of the president, secretary or other person authorized to bind the corporation in the matter.
 - Bids by sole-proprietorship shall be signed by the proprietor.
 - When requested, satisfactory evidence of the authority of the officer signing shall be furnished.
- I. Bidder should be aware of the following statutes that represent "Truth in Contracting" laws:
- N.J.S.A. 2C:21-34, et seq. governs false claims and representations by bidders. It is a serious crime for the bidder to knowingly submit a false claim and/or knowingly make material misrepresentation.
 - N.J.S.A. 2C:27-10 provides that a person commits a crime if said person offers a benefit to a public servant for an official act performed or to be performed by a public servant, which is a violation of official duty.
 - N.J.S.A. 2C:27-11 provides that a bidder commits a crime if said person, directly or indirectly, confers or agrees to confer any benefit not allowed by law to a public servant.
 - Bidder should consult the statutes or legal counsel for further information.
- J. Potential bidders are hereby cautioned that they are bidding at their own risk and that the specifications/bid packages may or may not be complete if the specifications/bid packages were provided by a third party supplier.
- The City shall not be responsible for third party supplied specifications/bid packages.
- K. The City reserves the right to reject individual and/or all bids in accordance with law.
- L. Any prospective bidder who wishes to challenge a bid specification shall file such challenge in writing with the Purchasing Agent no less than three (3) business days prior to the opening of the bids. Challenges filed after that time shall be considered void and having no impact on the contracting unit or the award of a contract; N.J.S.A. 40A: 11-13 (e).
- M. Contracts shall be awarded to the lowest responsive and responsible bidder. City Council reserves the right to reject any and all bids and to waive minor discrepancies therein. City Council also reserves the right to split bids, award individual items, or award groups of items and categories of items.
- N. Questions concerning this bid shall be directed in writing to the Division of Purchasing, Attention: Miguel A. Mercado, Purchasing Agent, either by facsimile at (856) 405-4605 or by email at PurchasingOffice@vinelandcity.org. The last day for questions is due at noon on Wednesday, November 5, 2025.

II. BID SECURITY AND BONDING REQUIREMENTS

The following provisions if indicated by an (X), shall be applicable to this bid and be made a part of the bid documents:

☒ A. BID GUARANTEE

Bidder shall submit with the bid a certified check, cashier's check or a bid bond in the amount of ten percent (10%) of the total price bid, but not in excess of \$20,000, payable unconditionally to the City.

When submitting a Bid Bond, it shall contain Power of Attorney for full amount of Bid Bond from a surety company authorized to do business in the State of New Jersey and acceptable to the City.

The check or bond of the unsuccessful bidder(s) shall be returned pursuant to N.J.S.A. 40A:11-24a. The check or bond of the bidder to whom the contract is awarded shall be retained until a contract is executed and the required performance bond or other security is submitted.

The check or bond of the successful bidder shall be forfeited if the bidder fails to enter into a contract pursuant to N.J.S.A. 40A:11-21.

Failure to submit a bid guarantee shall result in rejection of the bid.

☒ B. CONSENT OF SURETY

Bidder shall submit with the bid a Certificate (Consent of Surety) with Power of Attorney for full amount of bid price from a Surety Company authorized to do business in the State of New Jersey and acceptable to the City stating that it will provide said bidder with a Performance Bond in the full amount of the bid. This certificate shall be obtained in order to confirm that the bidder to whom the contract is awarded will furnish Performance and Payment Bonds from an acceptable surety company on behalf of said bidder, any or all subcontractors or by each respective subcontractor or by any combination thereof which results in performance security equal to the total amount of the contract, pursuant to N.J.S.A. 40A:11-22.

Failure to submit a consent of surety shall result in rejection of the bid.

☒ C. PERFORMANCE BOND

Successful bidder shall simultaneously with the delivery of the executed contract, submit an executed bond in the amount of one hundred percent (100%) of the acceptable bid as security for the faithful performance of this contract.

The performance bond provided shall not be released until final acceptance of the whole work and then only if any liens or claims have been satisfied. The surety on such bond or bonds shall be a duly authorized surety company authorized to do business in the State of New Jersey pursuant to N.J.S.A. 17:31-5.

Failure to submit this with the executed contract shall be cause for declaring the contract null and void pursuant to N.J.S.A. 40A:11-22.

☐ D. LABOR AND MATERIAL (PAYMENT) BOND

Bidder shall with the delivery of the performance bond submit an executed payment bond to guarantee payment to laborers and suppliers for the labor and material used in the work performed under the contract.

Failure to submit a labor and material bond with the performance bond shall be cause for declaring the contract null and void.

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E. MAINTENANCE BOND

Upon acceptance of the work by the City, the contractor shall submit a maintenance bond (N.J.S.A. 40A:11-16.3) in an amount not to exceed **100%** of the project costs guaranteeing against defective quality of work or materials for the period of:

_____ 1 year
 X 2 years

III. INTERPRETATION AND ADDENDA

- A. The bidder understands and agrees that its bid is submitted on the basis of the specifications prepared by the City. The bidder accepts the obligation to become familiar with these specifications.
- B. Bidders are expected to examine the specifications and related bid documents with care and observe all their requirements. Ambiguities, errors or omissions noted by bidders should be promptly reported in writing to the Purchasing Agent. Any prospective bidder who wishes to challenge a bid specification shall file such challenges in writing with the contracting agent no less than three business days prior to the opening of the bids. Challenges filed after that time shall be considered void and having no impact on the contracting unit or the award of a contract pursuant to N.J.S.A. 40A:11-13. In the event the bidder fails to notify the City of such ambiguities, errors or omissions, the bidder shall be bound by the requirements of the specifications and the bidder's submitted bid.
- C. No oral interpretation and or clarification of the meaning of the specifications for any goods and services will be made to any bidder. Such request shall be in writing, addressed to the Purchasing Agent. In order to be given consideration, a written request must be received at least ten (10) business days prior to the date fixed for the opening of the bid for goods and services.

All interpretations, clarifications and any supplemental instructions will be in the form of written addenda to the specifications, and will be distributed to all prospective bidders. All addenda so issued shall become part of the specification and bid documents, and shall be acknowledged by the bidder in the bid. The City's interpretations or corrections thereof shall be final.

When issuing addenda, the City shall provide required notice prior to the official receipt of bids to any person who has submitted a bid or who has received a bid package pursuant to N.J.S.A. 40A:11-23c.1.

D. Discrepancies in Bids

1. Ditto marks are not considered writing or printing and shall not be used.
2. In the event that there is a discrepancy between the unit prices and the extended totals, the unit prices shall prevail. In the event there is an error of the summation of the extended totals, the computation by the City of the extended totals shall govern.

E. Pre-Bid Conference

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If stated in the Notice to Bidders:
A Pre-Bid Conference is not required for this bid.

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A non-mandatory pre-bid conference for this proposal will be held on _____, at _____. Attendance is not mandatory, but is strongly recommended. Failure to attend does not relieve the bidder of any obligations or requirements. A site visit will immediately follow the pre-bid.

IV. BRAND NAMES, STANDARDS OF QUALITY AND PERFORMANCE

- A. Brand names and/or descriptions used in these specifications are to acquaint bidders with the types of goods and services desired and will be used as a standard by which goods and services offered as equivalent will be evaluated.
- B. Variations between the goods and services described and the goods and services offered are to be fully identified and described by the bidder on a separate sheet and submitted with the bid proposal form. Vendor literature WILL NOT suffice in explaining exceptions to these specifications. In the absence of any exceptions by the bidder, it will be presumed and required that the goods and services as described in the bid specification be provided or performed.
- C. It is the responsibility of the bidder to document and/or demonstrate the equivalency of the goods and services offered. The City reserves the right to evaluate the equivalency of the goods and services.
- D. In submitting its bid, the bidder certifies that the goods and services to be furnished will not infringe upon any valid patent or trademark and that the successful bidder shall, at its own expense, defend any and all actions or suits charging such infringement, and will save the City harmless from any damages resulting from such infringement.
- E. Only manufactured and farm products of the United States, wherever available, shall be used pursuant to N.J.S.A. 40A:11-18.
- F. The contractor shall guarantee any or all goods and services supplied under these specifications. Defective or inferior goods shall be replaced at the expense of the contractor. The contractor will be responsible for return freight or restocking charges.

V. INSURANCE AND INDEMNIFICATION

The insurance documents as listed below shall include but are not limited to the following coverage's. (where insurance requirements are listed under other sections of these specifications, the higher limits will prevail.)

A. INSURANCE REQUIREMENTS

1. Worker's Compensation Insurance

Workers Compensation insurance shall be maintained in full force during the life of the contract, covering all employees engaged in performance of the contract pursuant to N.J.S.A. 34:15-12(a) and N.J.A.C. 12:235-1.6. Statutory Limit for Workers' Compensation and \$500,000 for Employer's Liability.

2. General Liability Insurance

General liability insurance shall be provided with limits of not less than \$1,000,000 any one person/any one accident for bodily injury and property damage and \$3,000,000 aggregate, and shall be maintained in full force during the life of the contract.

3. Automobile Liability Insurance

Automobile liability insurance covering contractor for claims arising from owned, hired and non-owned vehicles with limits of not less than \$1,000,000 any one person / any one accident for bodily injury and property damage, and shall be maintained in full force during the life of the contract.

4. Other Forms of Insurance Required

B. CERTIFICATES OF THE REQUIRED INSURANCE

Certificates of Insurance for those policies required above shall be submitted with the contract. Such coverage shall be with an insurance company authorized to do business in the State of New Jersey and shall name the City of Vineland as an additional insured.

Self-insured contractors shall submit an affidavit attesting to their self-insured coverage and shall name the City of Vineland as an additional insured.

C. INDEMNIFICATION

Bidder shall indemnify and hold harmless the City of Vineland from all claims, suits or actions, and damages or costs of every name and description to which the City of Vineland may be subjected or put by reason of injury to the person or property of another, or the property of the City of Vineland resulting from negligent acts or omissions on the part of the contractor, the contractor's agents, servants or subcontractors in the delivery of goods and services, or in the performance of the work under the contract.

VI. PRICING INFORMATION FOR PREPARATION OF BIDS

A. The City of Vineland is exempt from any local, state or federal sales, use or excise tax.

B. Estimated Quantities (Open-End Contracts): The City has attempted to identify the item(s) and the estimated amounts of each item bid to cover its requirements; however, past experience shows that the amount ordered may be different than that submitted for bidding. The right is reserved to decrease or increase the quantities specified in the specifications pursuant to N.J.A.C. 5:30-11.2 and 11.10. NO MINIMUM PURCHASE IS IMPLIED OR GUARANTEED.

C. Contractor shall be responsible for obtaining any applicable permits or licenses from any government entity that has jurisdiction to require the same. All bids submitted shall have included this cost.

D. Bidders shall insert prices for furnishing goods and services required by these specifications. Prices shall be net, including any charges for packing, crating, containers, etc. All transportation charges shall be fully prepaid by the contractor, F.O.B. destination and placement at locations specified by the City. As specified, placement may require inside deliveries. No additional charges will be allowed for any transportation costs resulting from partial shipments made for the contractor's convenience.

VII. STATUTORY AND OTHER REQUIREMENTS

The following are mandatory requirements of this bid and contract.

A. MANDATORY AFFIRMATIVE ACTION CERTIFICATION

No firm may be issued a contract unless it complies with the affirmative action provisions of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27-1 et seq. The following information summarizes the full, required regulatory text, which is included as Exhibit A of this bid specification.

1. Goods and Services (including professional services) Contracts

Each contractor shall submit to the public agency, after notification of award but prior to execution of a goods and services contract, one of the following three documents:

- i. A photocopy of a valid letter that the contractor is operating under an existing Federally approved or sanctioned affirmative action program (good for one year from the date of the letter); or

- ii. A photocopy of a Certificate of Employee Information Report approval, issued in accordance with N.J.A.C. 17:27-4; or
- iii. A photocopy of an Employee Information Report (Form AA 302) provided by the Division and distributed to the public agency to be completed by the contractor in accordance with N.J.A.C. 17:27-4.

2. Maintenance/Construction Contracts

After notification of award, but prior to signing the contract, the contractor shall submit to the public agency compliance officer and the Division of Contract Compliance and Equal Employment Opportunity in Public Contracts (Division) an initial project workforce report (Form AA201) provided to the public agency by the Division for distribution to and completion by the contractor, in accordance with N.J.A.C. 17:27-7.

The contractor shall also submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of the contract to the Division and to the public agency compliance officer. The contractor shall also cooperate with the public agency in the payment of budgeted funds, as is necessary, for on-the job and/or off-the-job programs for outreach and training of minorities and women.

B. AMERICANS WITH DISABILITIES ACT OF 1990

Discrimination on the basis of disability in contracting for the purchase of goods and services is prohibited. Bidders are required to read Americans with Disabilities language that is included as Appendix A of this specification and agree that the provisions of Title II of the Act are made a part of the contract. The contractor is obligated to comply with the Act and to hold the City harmless.

C. STOCKHOLDER DISCLOSURE

N.J.S.A. 52:25-24.2 provides that no corporation, partnership, limited partnership, limited liability corporation, limited liability partnership, Subchapter S corporation or sole proprietorship, shall be awarded any contract for the performance of any work or the furnishing of any goods and services, unless, prior to the receipt of the bid or accompanying the bid of said corporation, partnership, limited partnership, limited liability corporation, limited liability partnership, Subchapter S corporation or sole proprietorship, bidders shall submit a statement setting forth the names and addresses of all stockholders in the corporation or partnership who own (10%) ten percent or more of its stock of any class, or of all individual partners in the partnership who own a ten percent or greater interest therein. The included Statement of ownership shall be completed and attached to the bid proposal. This requirement applies to all forms of corporations and partnerships, including, but not limited to, limited partnerships, limited liability corporations, limited liability partnerships and Subchapter S corporations. Failure to submit a stockholder disclosure document shall result in rejection of the bid.

D. PROOF OF BUSINESS REGISTRATION

N.J.S.A. 52:32-44 requires that each bidder (contractor) submit proof of business registration. Certificate must be submitted prior to award of the contract and the bidder had to have obtained the BRC prior to receipt of bids. A BRC is obtained from the New Jersey Division of Revenue. Information on obtaining a BRC is available on the internet at www.nj.gov/njbgs or by phone at (609) 292-1730. N.J.S.A. 52:32-44 imposes the following requirements on contractors and all subcontractors that **knowingly** provide goods or perform services for a contractor fulfilling this contract:

- 1) The contractor shall provide written notice to its subcontractors and suppliers to submit proof of business registration to the contractor;
- 2) Prior to receipt of final payment from a contracting agency, a contractor must submit to the contracting agency an accurate list of all subcontractors or attest that none was used;
- 3) During the term of this contract, the contractor and its affiliates shall collect and remit, and shall notify all subcontractors and their affiliates that they must collect and remit to the Director, New

Jersey Division of Taxation, the use tax due pursuant to the Sales and Use Tax Act, (N.J.S.A. 54:32B-1 et seq.) on all sales of tangible personal property delivered into this State.

A contractor, subcontractor or supplier who fails to provide proof of business registration or provides false business registration information shall be liable to a penalty of \$25 for each day of violation, not to exceed \$50,000 for each business registration not properly provided or maintained under a contract with a contracting agency. Information on the law and its requirements is available by calling (609) 292-1730.

If boxes of the following items are checked, they are mandatory requirements of the bid proposal and contract.

☐ E. NEW JERSEY WORKER AND COMMUNITY RIGHT TO KNOW ACT

The manufacturer or supplier of chemical substances or mixtures shall label them in accordance with the N.J. Worker and Community Right to Know Law (N.J.S.A. 34:5A-1 et seq., and N.J.A.C 8:59-2 et seq.). Containers that the law and rules require to be labeled shall show the Chemical Abstracts Service number of all the components and the chemical name. Further, all applicable Material Safety Data Sheets (MSDS) - hazardous substance fact sheet - must be furnished.

☒ F. PREVAILING WAGE ACT

Pursuant to N.J.S.A. 34:11-56.25 et seq., contractors on projects for public work shall adhere to all requirements of the New Jersey Prevailing Wage Act. The contractor shall be required to submit a certified payroll record to the City within ten (10) days of the payment of the wages. The contractor is also responsible for obtaining and submitting all subcontractors' certified payroll records within the aforementioned time period. The contractor shall submit said certified payrolls in the form set forth in N.J.A.C. 12:60-6.1(c). It is the contractor's responsibility to obtain any additional copies of the certified payroll form to be submitted by contacting the New Jersey Department of Labor and Workforce Development, Division of Workplace Standards. Bidders are cautioned to take into consideration statutory legal requirements, particularly, the payment of prevailing wages. It is Bidder's sole responsibility for determining the correct labor classification(s) and paying the correct and proper wage and benefits and it is imperative that the Contractor familiarize itself with the current wage and benefit rates before submitting bids based on these specifications. **NOTE: Additional information and current wage rates are available at: http://lwd.state.nj.us/labor/wagehour/wagehour_index.html.**

☒ G. THE PUBLIC WORKS CONTRACTOR REGISTRATION ACT

N.J.S.A. 34:11-56.48 et seq. requires that a general or prime contractor and any listed subcontractors named in the contractor's bid proposal shall possess a certificate *at the time the bid proposal is submitted*. After bid proposals are received and prior to award of contract, the successful contractor shall submit a copy of the contractor's certification along with those of all listed subcontractors. All non-listed subcontractors and lower tier sub-subcontractors shall be registered prior to starting work on the project. It is the general contractor's responsibility that all non-listed sub-contractors at any tier have their certificate prior to starting work on the job.

Under the law a "contractor" is "a person, partnership, association, joint stock company, trust, corporation or other legal business entity or successor thereof who enters into a contract" which is subject to the provisions of the New Jersey Prevailing Wage Act [N.J.S.A. 34:11-56.25, et seq.] It applies to contractors based in New Jersey or in another state.

The law defines "public works projects" as contracts for "public work" as defined in the Prevailing Wage statute [N.J.S.A. 34:11-56.26(5)]. The term means:

- "Construction, reconstruction, demolition, alteration, or repair work, or maintenance work, including painting and decorating, done under contract and paid for in whole or in part out of the funds of a public body, except work performed under a rehabilitation program.

- "Public work" shall also mean construction, reconstruction, demolition, alteration, or repair work, done on any property or premises, whether or not the work is paid for from public funds..."
- "Maintenance work" means the repair of existing facilities when the size, type or extent of such facilities is not thereby changed or increased. While "maintenance" includes painting and decorating and is covered under the law, it does not include work such as routine landscape maintenance or janitorial services.

To register, a contractor must provide the State Department of Labor with a full and accurately completed application form. The form is available online at http://lwd.state.nj.us/labor/wagehour/regperm/pw_cont_reg.html

N.J.S.A. 34:11-56.55 specifically prohibits accepting applications for registration as a substitute for a certificate of registration.

☐ **H. NON-COLLUSION AFFIDAVIT (Not Applicable)**

The Affidavit shall be properly executed and submitted with the bid proposal.

I. PAY TO PLAY

Starting in January, 2007, business entities are advised of their responsibility to file an annual disclosure statement of political contributions with the New Jersey Election Law Enforcement Commission (ELEC) pursuant to N.J.S.A. 19:44A-20.27 if they receive contracts in excess of \$50,000 from public entities in a calendar year.

Business entities are responsible for determining if filing is necessary. Additional information on this requirement is available from ELEC at 888-313-3532 or at www.elec.state.nj.us.

J. NJ ONE CALL

By presenting a bid, contractor declares that he is aware of and, if required, will comply with the requirements of the "Underground Facility Protection Act (Public Law 1994, Chapter 118)" prior to commencing any intended excavation. The telephone number to call is 1-800-272-1000. The successful bidder will be required to show compliance with the requirement by submitting to the appropriate project coordinator the confirmation number obtained from ONE-CALL before any excavation is undertaken.

VIII. METHOD OF CONTRACT AWARD

- A. The length of the contract shall be stated in the technical specifications. Pursuant to requirements of N.J.A.C. 5:30-5.1 et seq., any contract resulting from this bid shall be subject to the availability and appropriation of sufficient funds annually. Please see Section X, Termination of Contract, Sub-section E, for additional information.
- B. If the award is to be made on the basis of a base bid only, it shall be made to that responsible bidder submitting the lowest base bid.
- C. If the award is to be made on the basis of a combination of a base bid with selected options, it shall be made to that responsible bidder submitting the lowest net bid.
- D. The City may also elect to award the contract on the basis of unit prices.

- E. The form of contract shall be submitted by the City to the successful bidder. Terms of the specifications/bid package prevail. Bidder exceptions must be formally accepted by the City.
- F. **Choice of Law:** The agreement with the successful bidder shall be construed in accordance with the laws of the State of New Jersey. In the event of litigation or other legal proceedings commenced to enforce the terms of the agreement, the venue of such litigation shall be the Superior Court of New Jersey, Cumberland County.

IX. CAUSES FOR REJECTING BIDS

Bids may be rejected for any of the following reasons:

- A. All bids pursuant to N.J.S.A. 40A:11-13.2;
- B. If more than one bid is received from an individual, firm or partnership, corporation or association under the same name;
- C. Multiple bids from an agent representing competing bidders;
- D. The bid is inappropriately unbalanced;
- E. The bidder is determined to possess, pursuant to N.J.S.A. 40A:11-4b, Prior Negative Experience; or,
- F. If the successful bidder fails to enter into a contract within 21 days, Sundays and holidays excepted, or as otherwise agreed upon by the parties to the contract. In this case at its option, the City may accept the bid of the next lowest responsible bidder. (N.J.S.A. 40A:11-24b)

X. TERMINATION OF CONTRACT

- A. If, through any cause, the contractor shall fail to fulfill in a timely and proper manner obligations under the contract or if the contractor shall violate any of the requirements of the contract, the City shall there upon have the right to terminate the contract by giving written notice to the contractor of such termination and specifying the effective date of termination. Such termination shall relieve the City of any obligation for balances to the contractor of any sum or sums set forth in the contract. City will pay only for goods and services accepted prior to termination.
- B. Notwithstanding the above, the contractor shall not be relieved of liability to the City for damages sustained by the City by virtue of any breach of the contract by the contractor and the City may withhold any payments to the contractor for the purpose of compensation until such time as the exact amount of the damage due the City from the contractor is determined.
- C. The contractor agrees to indemnify and hold the City harmless from any liability to subcontractors/suppliers concerning payment for work performed or goods supplied arising out of the lawful termination of the contract by the City under this provision.
- D. In case of default by the contractor, the City may procure the goods or services from other sources and hold the contractor responsible for any excess cost.
- E. Continuation of the terms of the contract beyond the fiscal year is contingent on availability of funds in the following year's budget. In the event of unavailability of such funds, the City reserves the right to cancel the contract.
- F. ACQUISITION, MERGER, SALE AND/OR TRANSFER OF BUSINESS, ETC.

It is understood by all parties that if, during the life of the contract, the contractor disposes of his/her business concern by acquisition, merger, sale and or/transfer or by any means convey his/her interest(s) to another party, all obligations are transferred to that new party. In this event, the new City(s) will be required to submit all documentation/legal instruments that were required in the original bid/contract. Any change shall be approved by the City.

- G. The contractor will not assign any interest in the contract and shall not transfer any interest in the same without the prior written consent of the City.
- H. The City may terminate the contract for convenience by providing 60 calendar days advanced notice to the contractor.

XI. PAYMENT

- A. No payment will be made unless duly authorized by the City's authorized representative and accompanied by proper documentation. The City is not permitted to pay down payments or deposits on contracts.
- B. Payment will be made in accordance with the City's policy and procedures.

XII. W-9

- A. Bidder shall complete W-9 form and submit to the City of Vineland Division of Purchasing prior to contract award. This form is available at the following link:
<http://www.irs.gov/pub/irs-pdf/fw9.pdf?portlet=3>

XIII. Contract Records

As per N.J.A.C. 17:44-2.2, the vendor shall maintain all documentation related to products, transactions, or services under this contract for a period of five years from the date of final payment. Such records shall be made available to the New Jersey Office of the State Comptroller upon request.

XIV. Time of Completion

The contractor shall achieve Substantial Completion of the project within one hundred fifty (150) calendar days from the date of the Notice to Proceed.

Permission for Bidder to Withdraw a Bid Due to a Mistake in Certain Circumstances

(N.J.S.A. 40A:11-23.3)

N.J.S.A. 40A:11-23.3 authorizes a bidder to request withdrawal of a public works bid due to a mistake on the part of the bidder. A mistake is defined by N.J.S.A. 40A:11-2(42) as a clerical error that is an **unintentional and substantial computational error or an unintentional omission of a substantial quantity of labor, material, or both, from the final bid computation.**

A bidder claiming a mistake under N.J.S.A. 40A:11-23.3 must submit a request for withdrawal, **in writing**, by certified or registered mail to _____ Purchasing Agent, City of Vineland, 640 E. Wood Street, P.O. Box 1508, Vineland, NJ 08361-1508. The bidder must request withdrawal of a bid due to a mistake, as defined by the law, within five business days after the receipt and opening of the bids. Since the bid withdrawal request shall be effective as of the postmark of the certified or registered mailing, _____ Purchasing Agent, may contact all bidders, after bids are opened, to ascertain if any bidders wish to, or already have exercised a request to withdraw their bid pursuant to N.J.S.A. 40A:11-23.3.

A bidder's request to withdraw the bid **shall** contain evidence, including any pertinent documents, demonstrating that a mistake was made. Such documents and relevant written information shall be reviewed and evaluated by the City of Vineland's designated staff pursuant to the statutory criteria of N.J.S.A. 40A:11-23.3.

The City of Vineland will not consider any written request for a bid withdrawal for a mistake, as defined by N.J.S.A. 40A:11-2(42), by a bidder in the preparation of a bid proposal unless the postmark of the certified or registered mailing is within the five business days following the opening of bids.

LOWEST BIDDER PREVAILING WAGE CERTIFICATION

In the case of a Bidder making the lowest bid for this contract by at least ten percent (10%) under the amount of the next lowest bidder, they shall be required to certify to the City of Vineland prior to the award of a contract that the prevailing wage rates required pursuant to the Prevailing Wage Act shall be paid in performing the work under the contract. In the event that the Bidder does not provide the certification prior to the award of the contract, the City of Vineland shall award the contract to the next lowest responsible and responsive bidder.

NEW JERSEY ANTI-DISCRIMINATION PROVISIONS
NJ.S.A.10:2-1 ET SEQ.

Pursuant to NJ.S.A. 10:2-1, if awarded a contract, the contractor agrees that:

- A. In the hiring of persons for the performance of work under this contract or any subcontract hereunder, or for the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under this contract, no contractor, nor any person acting on behalf of such contractor or subcontractor, shall, by reason of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex, discriminate against any person who is qualified and available to perform the work to which the employment relates;
- B. No contractor, subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee engaged in the performance of work under this contract or any subcontract hereunder, or engaged in the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under such contract, on account of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex;
- C. There may be deducted from the amount payable to the contractor by the contracting public agency, under this contract, a penalty of \$50.00 for each person for each calendar day during which such person is discriminated against or intimidated in violation of the provisions of the contract; and
- D. This contract may be canceled or terminated by the contracting public agency, and all money due or to become due hereunder may be forfeited, for any violation of this section of the contract occurring after notice to the contractor from the contracting public agency of any prior violation of this section of the contract.

Provisions Concerning Changed Conditions in Construction Contracts (N.J.S.A. 40A:11-16.7)

(1) If the contractor encounters differing site conditions during the progress of the work of the contract, the contractor shall promptly notify the contracting unit in writing of the specific differing site conditions encountered before the site is further disturbed and before any additional work is performed in the impacted area.

(2) Upon receipt of a differing site conditions notice in accordance with paragraph (1) of this subsection, or upon the contracting unit otherwise learning of differing site conditions, the contracting unit shall promptly undertake an investigation to determine whether differing site conditions are present.

(3) If the contracting unit determines different site conditions that may result in additional costs or delays exist, the contracting unit shall provide prompt written notice to the contractor containing directions on how to proceed.

(4) (a) The contracting unit shall make a fair and equitable adjustment to the contract price and contract completion date for increased costs and delays resulting from the agreed upon differing site conditions encountered by the contractor.

(b) If both parties agree that the contracting unit's investigation and directions decrease the contractor's costs or time of performance, the contracting unit shall be entitled to a fair and equitable downward adjustment of the contract price or time of performance.

(c) If the contracting unit determines that there are no differing site conditions present that would result in additional costs or delays, the contracting unit shall so advise the contractor, in writing, and the contractor shall resume performance of the contract, and shall be entitled to pursue a differing site conditions claim against the contracting unit for additional compensation or time attributable to the alleged differing site conditions.

(5) Execution of the contract by the contractor shall constitute a representation that the contractor has visited the site and has become generally familiar with the local conditions under which the work is to be performed.

(6) As used in this subsection, "differing site conditions" mean physical conditions at the contract work site that are subsurface or otherwise concealed and which differ materially from those indicated in the contract documents or are of such an unusual nature that the conditions differ materially from those ordinarily encountered and generally recognized as inherent in the work of the character provided for in the contract.

b. A contract subject to this section shall include the following suspension of work provisions:

(1) The contracting unit shall provide written notice to the contractor in advance of any suspension of work lasting more than 10 calendar days of the performance of all or any portion of the work of the contract.

(2) If the performance of all or any portion of the work of the contract is suspended by the contracting unit for more than 10 calendar days due to no fault of the contractor or as a consequence of an occurrence beyond the contracting unit's control, the contractor shall be entitled to compensation for any resultant delay to the project completion or additional contractor expenses, and to an extension of time, provided that, to the extent feasible, the contractor, within 10 calendar days following the conclusion of the suspension, notifies the contracting unit, in writing, of the nature and extent of the suspension of work. The notice shall include available supporting information, which information may thereafter be supplemented by the contractor as needed and as may be reasonably requested by the contracting unit.

Whenever a work suspension exceeds 60 days, upon seven days' written notice, either party shall have the option to terminate the contract for cause and to be fairly and equitably compensated therefor.

(3) Upon receipt of the contractor's suspension of work notice in accordance with paragraph (2) of this subsection, the contracting unit shall promptly evaluate the contractor's notice and promptly advise the contractor of its determination on how to proceed in writing.

(4) (a) If the contracting unit determines that the contractor is entitled to additional compensation or time, the contracting unit shall make a fair and equitable upward adjustment to the contract price and contract completion date.

(b) If the contracting unit determines that the contractor is not entitled to additional compensation or time, the contractor shall proceed with the performance of the contract work, and shall be entitled to pursue a suspension of work claim against the contracting unit for additional compensation or time attributable to the suspension.

(5) Failure of the contractor to provide timely notice of a suspension of work shall result in a waiver of a claim if the contracting unit can prove by clear and convincing evidence that the lack of notice or delayed notice by the contractor actually prejudiced the contracting unit's ability to adequately investigate and defend against the claim.

c. A contract subject to this section shall include the following change in character of work provisions:

(1) If the contractor believes that a change directive by the contracting unit results in a material change to the contract work, the contractor shall so notify the contracting unit in writing. The contractor shall continue to perform all work on the project that is not the subject of the notice.

(2) Upon receipt of the contractor's change in character notice in accordance with paragraph (1) of this subsection, the contracting unit shall promptly evaluate the contractor's notice and promptly advise the contractor of its determination on how to proceed in writing.

(3) (a) If the contracting unit determines that a change to the contractor's work caused or directed by the contracting unit materially changes the character of any aspect of the contract work, the contracting unit shall make a fair and equitable upward adjustment to the contract price and contract completion date. The basis for any such price adjustment shall be the difference between the cost of performance of the work as planned at the time of contracting and the actual cost of such work as a result of its change in character, or as otherwise mutually agreed upon by the contractor and the contracting unit prior to the contractor performing the subject work.

(b) If the contracting unit determines that the contractor is not entitled to additional compensation or time, the contractor shall continue the performance of all contract work, and shall be entitled to pursue a claim against the contracting unit for additional compensation or time attributable to the alleged material change.

(4) As used in this subsection, "material change" means a character change which increases or decreases the contractor's cost of performing the work, increases or decreases the amount of time by which the contractor completes the work in relation to the contractually required completion date, or both.

d. A contract subject to this section shall include the following change in quantity provisions:

(1) The contracting unit may increase or decrease the quantity of work to be performed by the contractor.

(2) (a) If the quantity of a pay item is cumulatively increased or decreased by 20 percent or less from the bid proposal quantity, the quantity change shall be considered a minor change in quantity.

(b) If the quantity of a pay item is increased or decreased by more than 20 percent from the bid proposal quantity, the quantity change shall be considered a major change in quantity.

(3) For any minor change in quantity, the contracting unit shall make payment for the quantity of the pay item performed at the bid price for the pay item.

(4) (a) For a major increase in quantity, the contracting unit or contractor may request to renegotiate the price for the quantity in excess of 120 percent of the bid proposal quantity. If a mutual agreement cannot be reached on a negotiated price for a major quantity increase, the contracting unit shall pay the actual costs plus an additional 10 percent for overhead and an additional 10 percent for profit, unless otherwise specified in the original bid.

(b) For a major decrease in quantity, the contracting unit or contractor may request to renegotiate the price for the quantity of work performed. If a mutual agreement cannot be reached on a negotiated price for a major quantity decrease, the contracting unit shall pay the actual costs plus an additional 10 percent for overhead and an additional 10 percent for profit, unless otherwise specified in the original bid; provided, however, that the contracting unit shall not make a payment in an amount that exceeds 80 percent of the value of the bid price multiplied by the bid proposal quantity.

(5) As used in this subsection, the term "bid proposal quantity" means the quantity indicated in the bid proposal less the quantities designated in the project plans as "if and where directed."

City of Vineland

Revised Contract Language for BRC Compliance

Goods and Services Contracts (including Purchase Orders)

***Construction Contracts (including Public Works related Purchase Orders)**

N.J.S.A. 52:32-44 imposes the following requirements on contractors and all subcontractors that knowingly provide goods or perform services for a contractor fulfilling this contract:

1. The contractor shall provide written notice to its subcontractors and suppliers to submit proof of business registration to the contractor;
2. Subcontractors through all tiers of a project must provide written notice to their subcontractors and suppliers to submit proof of business registration and subcontractors shall collect such proofs of business registration and maintain them on file;
3. Prior to receipt of final payment from a contracting agency, a contractor must submit to the contracting agency an accurate list of all subcontractors and suppliers or attest that none was used;
4. During the term of this contract, the contractor and its affiliates shall collect and remit and shall notify all subcontractors and their affiliates that they must collect and remit to the Director, New Jersey Division of Taxation, the use tax due pursuant to the Sales and Use Tax Act, (N.J.S.A. 54:32B-1 et seq.) on all sale of tangible personal property delivered into this State.

Pursuant to J.J.S.A. 54:49-4.1, a business organization that fails to provide a copy of a business registration as required, or that provides false business registration information, shall be liable for a penalty of \$25 for each day of violation, not to exceed \$50,000, for each proof of business registration not properly provided under a contract with a contracting agency. Information on the law and its requirements is available by calling (609) 292-9292.

NEW JERSEY BUSINESS REGISTRATION

Pursuant to P.L. 2004, c.57, all consultants (both in-state and out-of-state) must obtain a Business Registration Certificate (BRC) from the New Jersey Department of the Treasury, Division of Revenue prior to conducting business with the NJTPA. A consultant or sub-consultant who fails to submit a copy of a valid BRC in accordance with the statute will be held liable for monetary penalties in accordance with N.J.S.A. 54:49-4.1. Questions regarding how to obtain a BRC can be directed to the New Jersey Division of Revenue at (609) 292-1730. The business registration form (Form NJ-REG) can be found online at:

<http://www.state.nj.us/treasury/revenue/busregcert.shtml> or

<http://www.state.nj.us/treasury/revenue/gettingregistered.shtml>

Sample New Jersey Registration Certificates:

STATE OF NEW JERSEY BUSINESS REGISTRATION CERTIFICATE		DEPARTMENT OF TREASURY/ DIVISION OF REVENUE PO BOX 252 TRENTON, N J 08646-0252
TAXPAYER NAME:	TRADE NAME:	
TAXPAYER IDENTIFICATION#:	SEQUENCE NUMBER:	
ADDRESS:	ISSUANCE DATE:	
EFFECTIVE DATE:	<i>John S. Tully</i> Acting Director	
FORM-BRC(08-01)	This Certificate is NOT assignable or transferable. It must be conspicuously displayed at above address.	

STATE OF NEW JERSEY BUSINESS REGISTRATION CERTIFICATE	
Taxpayer Name:	TAX REG TEST ACCOUNT
Trade Name:	
Address:	847 ROEBLING AVE TRENTON, NJ 08611
Certificate Number:	1093907
Date of Issuance:	October 14, 2004
For Office Use Only: 20041014112823533	

**THIS PROJECT REQUIRES A CERTIFICATE
FOR PUBLIC WORKS CONTRACTOR REGISTRATION
FOR GENERAL CONTRACTORS AND SUBCONTRACTORS IN
ACCORDANCE WITH PL 1999 C. 238**

For questions or information about PL 1999, C.238, please call Contractor Registration Unit, New Jersey Department of Labor, Division of Wage and Hour Compliance, (609) 292-9464 or email: contreg@dol.state.nj.us

The website is: <http://www.nj.gov/labor/wageandhour/registration-permits/register/publicworksregistration.shtml>

CERTIFICATE MUST BE SUBMITTED TO THE CITY OF VINELAND PURCHASING DEPARTMENT PRIOR TO CONTRACT AWARD. CERTIFICATES MUST ALSO BE SUBMITTED FOR ANY/ALL OF THE COMPANIES/INDIVIDUALS LISTED ON THE SUBCONTRACTORS LIST AS THE PRIME SUBCONTRACTORS (AS REQUIRED BY N.J.S.A. 40A:11-16)

The City of Vineland cannot accept applications. We cannot award a contract if the certificate was not issued to the contractor/subcontractor prior to submission of the bid.

Certificate Number	Expiration Date

State of New Jersey



Department of Labor
Division of Wage and Hour Compliance

Public Works Contractor Registration Act

Pursuant to Public Law 1999 Chapter 238, the Public Works Contractor Registration Act, this
certificate of registration, for purposes of bidding on and engaging in
public work is issued to

2004

This certificate may not be transferred or assigned
and may be revoked for cause by the Commissioner of Labor



Albert G. Krull
ALBERT G. KRULL, Commissioner
Department of Labor

NON TRANSFERABLE

MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE
N.J.S.A. 10:5-31 et seq. (P.L.1975, c.127) and N.J.A.C. 17:27-1.1 et seq.

CONSTRUCTION CONTRACTS

During the performance of this contract, the contractor agrees as follows:

The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or expression, the contractor will ensure that equal employment opportunity is afforded to such applicants in recruitment and employment, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Such equal employment opportunity shall include, but not be limited to the following: employment, 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. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.

The contractor or subcontractor, where applicable will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.

The contractor or subcontractor will send to each labor union, with which it has a collective bargaining agreement, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under this act and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The contractor or subcontractor, where applicable, agrees to comply with any regulations promulgated by the Treasurer, pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented from time to time and the Americans with Disabilities Act.

When hiring or scheduling workers in each construction trade, the contractor or subcontractor agrees to make good faith efforts to employ minority and women workers in each construction trade consistent with the targeted employment goal prescribed by N.J.A.C. 17:27-7.2; provided, however, that the Dept. of LWD, Construction EEO Monitoring Program, may, in its discretion, exempt a contractor or subcontractor from compliance with the good faith procedures prescribed by the following provisions, A, B, and C, as long as the Dept. of LWD, Construction EEO Monitoring Program is satisfied that the contractor or subcontractor is employing workers provided by a union which provides evidence, in accordance with standards prescribed by the Dept. of LWD, Construction EEO Monitoring Program, that its percentage of active "card carrying" members who are minority and women workers is equal to or greater than the targeted employment goal established in accordance with N.J.A.C. 17:27-7.2. The contractor or subcontractor agrees that a good faith effort shall include compliance with the following procedures:

(A) If the contractor or subcontractor has a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor shall, within three business days of the contract award, seek assurances from the union that it will cooperate with the contractor or subcontractor as it fulfills its affirmative action obligations under this contract and in accordance with the rules promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et. seq., as supplemented and amended from time to time and the Americans with Disabilities Act. If the contractor or subcontractor is unable to obtain said assurances from the construction trade union at least five business days prior to the commencement of construction work, the contractor or subcontractor agrees to afford equal employment opportunities minority and women workers directly, consistent with this chapter. If the contractor's or subcontractor's prior experience with a construction trade union, regardless of whether the union has provided said assurances, indicates a significant possibility that the trade union will not refer sufficient minority and women workers consistent with affording equal employment opportunities as specified in this chapter, the contractor or subcontractor agrees to be prepared to provide such opportunities to minority and women workers directly, consistent with this chapter, by complying with the hiring or scheduling procedures prescribed under (B) below; and the contractor or subcontractor further agrees to take said action immediately if it determines that the union is not referring minority and women workers consistent with the equal employment opportunity goals set forth in this chapter.

(B) If good faith efforts to meet targeted employment goals have not or cannot be met for each construction trade by adhering to the procedures of (A) above, or if the contractor does not have a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor agrees to take the following actions:

- (1) To notify the public agency compliance officer, the Dept. of LWD, Construction EEO Monitoring Program, and minority and women referral organizations listed by the Division pursuant to N.J.A.C. 17:27-5.3, of its workforce needs, and request referral of minority and women workers;
- (2) To notify any minority and women workers who have been listed with it as awaiting available vacancies;
- (3) Prior to commencement of work, to request that the local construction trade union refer minority and women workers to fill job openings, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade;
- (4) To leave standing requests for additional referral to minority and women workers with the local construction trade union, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade, the State Training and Employment Service and other approved referral sources in the area;
- (5) If it is necessary to lay off some of the workers in a given trade on the construction site, layoffs shall be conducted in compliance with the equal employment opportunity and nondiscrimination standards set forth in this regulation, as well as with applicable Federal and State court decisions;
- (6) To adhere to the following procedure when minority and women workers apply or are referred to the contractor or subcontractor:
 - (i) The contractor or subcontractor shall interview the referred minority or women worker.
 - (ii) If said individuals have never previously received any document or certification signifying a level of qualification lower than that required in order to perform the work of the construction trade, the contractor or subcontractor shall in good faith determine the qualifications of such individuals. The contractor or subcontractor shall hire or schedule those individuals who satisfy appropriate qualification standards in conformity with the equal employment opportunity and non-discrimination principles set forth in this chapter. However, a contractor or subcontractor shall determine that the individual at least possesses the requisite skills, and experience recognized by a union, apprentice program or a referral agency, provided the referral agency is acceptable to the Dept. of LWD, Construction EEO Monitoring Program. If necessary, the contractor or subcontractor shall hire or schedule minority and women workers who qualify as trainees pursuant to these rules. All of the requirements, however, are limited by the provisions of (C) below.
 - (iii) The name of any interested women or minority individual shall be maintained on a waiting list, and shall be considered for employment as described in (i) above, whenever vacancies occur. At the request of the Dept. of LWD, Construction EEO Monitoring Program, the contractor or subcontractor shall provide evidence of its good faith efforts to employ women and minorities from the list to fill vacancies.
 - (iv) If, for any reason, said contractor or subcontractor determines that a minority individual or a woman is not qualified or if the individual qualifies as an advanced trainee or apprentice, the contractor or subcontractor shall inform the individual in writing of the reasons for the determination, maintain a copy of the determination in its files, and send a copy to the public agency compliance officer and to the Dept. of LWD, Construction EEO Monitoring Program.
- (7) To keep a complete and accurate record of all requests made for the referral of workers in any trade covered by the contract, on forms made available by the Dept. of LWD, Construction EEO Monitoring Program and submitted promptly to the Dept. of LWD, Construction EEO Monitoring Program upon request.

(C) The contractor or subcontractor agrees that nothing contained in (B) above shall preclude the contractor or subcontractor from complying with the union hiring hall or apprenticeship policies in any applicable collective bargaining agreement or union hiring hall arrangement, and, where required by custom or agreement, it shall send journeymen and trainees to the union for referral, or to the apprenticeship program for admission, pursuant to such agreement or arrangement. However, where the practices of a union or apprenticeship program will result in the exclusion of minorities and women or the failure to refer minorities and women consistent with the targeted county employment goal, the contractor or subcontractor shall consider for employment persons referred pursuant to (B) above without regard to such agreement or arrangement; provided further, however, that the contractor or subcontractor shall not be required to employ women and minority advanced trainees and trainees in numbers which result in the employment of advanced trainees and trainees as a percentage of the total workforce for the construction trade, which percentage significantly exceeds the apprentice to journey worker ratio specified in the applicable

collective bargaining agreement, or in the absence of a collective bargaining agreement, exceeds the ratio established by practice in the area for said construction trade. Also, the contractor or subcontractor agrees that, in implementing the procedures of (B) above, it shall, where applicable, employ minority and women workers residing within the geographical jurisdiction of the union.

After notification of award, but prior to signing a construction contract, the contractor shall submit to the public agency compliance officer and the Dept. of LWD, Construction EEO Monitoring Program an initial project workforce report (Form AA-201) electronically provided to the public agency by the Dept. of LWD, Construction EEO Monitoring Program, through its website, for distribution to and completion by the contractor, in accordance with N.J.A.C. 17:27-7. The contractor also agrees to submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of this contract to the Dept. of LWD, Construction EEO Monitoring Program, and to the public agency compliance officer.

The contractor agrees to cooperate with the public agency in the payment of budgeted funds, as is necessary, for on-the-job and/or off-the job programs for outreach and training of minorities and women.

(D) The contractor and its subcontractors shall furnish such reports or other documents to the Dept. of LWD, Construction EEO Monitoring Program as may be requested by the Dept. of LWD, Construction EEO Monitoring Program from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Dept. of LWD, Construction EEO Monitoring Program for conducting a compliance investigation pursuant to N.J.A.C. 17:27-1.1 et seq.

**AMERICANS WITH DISABILITIES ACT OF
1990
Equal Opportunity for Individuals with
Disability**

The contractor and the City of Vineland, (hereafter "City") do hereby agree that the provisions of Title 11 of the Americans with Disabilities Act of 1990 (the "Act") (42 U.S.C. SJ 21 01 et seq.), which prohibits discrimination on the basis of disability by public entities in all services, programs, and activities provided or made available by public entities, and the rules and regulations promulgated pursuant there unto, are made a part of this contract. In providing any aid, benefit, or service on behalf of the City pursuant to this contract, the contractor agrees that the performance shall be in strict compliance with the Act. In the event that the contractor, its agents, servants, employees, or subcontractors violate or are alleged to have violated the Act during the performance of this contract, the contractor shall defend the City in any action or administrative proceeding commenced pursuant to this Act. The contractor shall indemnify, protect, and save harmless the City, its agents, servants, and employees from and against any and all suits, claims, losses, demands, or damages, of whatever kind or nature arising out of or claimed to arise out of the alleged violation. The contractor shall, at its own expense, appear, defend, and pay any and all charges for legal services and any and all costs and other expenses arising from such action or administrative proceeding or incurred in connection therewith. In any and all complaints brought pursuant to the City's grievance procedure, the contractor agrees to abide by any decision of the City which is rendered pursuant to said grievance procedure. If any action or administrative proceeding results in an award of damages against the City, or if the City incurs any expense to cure a violation of the ADA which has been brought pursuant to its grievance procedure, the contractor shall satisfy and discharge the same at its own expense.

The City shall, as soon as practicable after a claim has been made against it, give written notice thereof to the contractor along with full and complete particulars of the claim, if any action or administrative proceeding is brought against the City or any of its agents, servants, and employees, the City shall expeditiously forward or have forwarded to the contractor every demand, complaint, notice, summons, pleading, or other process received by the City or its representatives.

It is expressly agreed and understood that any approval by the City of the services provided by the contractor pursuant to this contract will not relieve the contractor of the obligation to comply with the Act and to defend, indemnify, protect, and save harmless the City pursuant to this paragraph.

It is further agreed and understood that the City assumes no obligation to indemnify or save harmless the contractor, its agents, servants, employees and subcontractors for any claim which may arise out of their performance of this Agreement. Furthermore, the contractor expressly understands and agrees that the provisions of this indemnification clause shall in no way limit the contractor's obligations assumed in this Agreement, nor shall they be construed to relieve the contractor from any liability, nor preclude the City from taking any other actions available to it under any other provisions of the Agreement or otherwise at law.

PROJECT MANUAL FOR:

**Vineland City
Municipal Court
Renovations**

736 East Landis Avenue
Vineland, NJ 08360

FOR:

City of Vineland
640 East Wood Street
Vineland, NJ 08360

ARCHITECT

Manders Merighi Portadin Farrell Architects, LLC
1138 East Chestnut Avenue #4
Vineland, NJ 08360

MECHANICAL / PLUMBING / ELECTRICAL ENGINEER

BCCLT, Inc.

1138 East Chestnut Avenue #7A
Vineland, NJ 08360

Project Number 22.019

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Removal of designated construction and finishes.
- B. Disposal of materials.
- C. Identification of utilities.
- D. Coordination with Owner's continued occupancy requirements.
- E. Removal and protection of items designated to be returned to the Owner.
- F. Protection of all construction designated to remain.

1.2 RELATED SECTIONS

- A. Summary of Work: Owner's continued occupancy.
- B. Division 1 - Construction Facilities and Temporary Controls: Barricades, security at Owner occupied areas, and cleanup during construction.
- C. Division 1 - Contract Closeout: Project record documents.

1.3 REGULATORY REQUIREMENTS

- A. Conform to applicable code for demolition work, dust control, products requiring electrical disconnection and re-connection.
- B. Obtain required permits from authorities.
- C. Do not close or obstruct egress width to any building or site exit.
- D. Do not disable or disrupt building fire or life safety systems without 3 days prior written notice to Owner.
- E. Coordinate interruption of any building systems or services as required for Owner's continued occupancy.
- F. Conform to procedures applicable when hazardous or contaminated materials are discovered.

1.4 SCHEDULING

- A. Verify work schedule to coordinate with Owner's continued occupancy requirements.
- B. Schedule Work to precede new construction.
- C. Describe demolition removal procedures and schedule.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PREPARATION

- A. Provide, erect, and maintain temporary barriers and security devices.
- B. Protect existing materials which are not to be demolished.
- C. Prevent movement of structure; provide bracing and shoring.
- D. Notify affected utility companies before starting work and comply with their requirements.
- E. Mark location and termination of utilities.
- F. Provide appropriate temporary signage including signage for exit or building egress.

3.2 DEMOLITION

- A. Disconnect, remove, cap, and identify designated utilities within demolition areas.
- B. Demolish in an orderly and careful manner. Protect existing structures.
- C. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.
- D. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

END OF SECTION

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Rough carpentry and finish carpentry. Refer to Schedule located at the end of this Section.
- B. Concealed wood blocking for support for accessories, etc.
- C. Custom plastic laminate cabinetry and solid surface countertops.
- D. Miscellaneous casing and trim.
- E. Miscellaneous items.

1.2 RELATED WORK

- A. Section 092600 - Gypsum Board Systems.
- B. Section 099000 - Painting: Site finishing of finish carpentry and cabinetwork.
- C. Division 22 - Plumbing Fixtures.
- D. Division 26 - Electrical.

1.3 REFERENCES

- A. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.
- B. APA: American Plywood Association.
- C. AWWPA (American Wood Preservers Association) C1 - All Timber Products Preservative Treatment by Pressure Process.
- D. NFPA: National Forest Products Association.
- E. SPIB: Southern Pine Inspection Bureau.
- F. WWPA: Western Wood Products Association.
- G. NEMAL D3-1985: High pressure decorative laminates.
- H. FSMMA-A-130- Adhesive, contact.

1.4 QUALITY ASSURANCE

- A. Rough Carpentry Lumber: Visible grade stamp, of agency certified by National Forest Products Association (NFPA).
- B. When applicable, fabricate cabinetry and site made finish carpentry items in accordance with recommendations of Quality Standards of Architectural Woodwork Institute (AWI).

- C. Perform work in accordance with the following agencies:
 - 1. Lumber Grading Agency: Certified by ALSC.
 - 2. Plywood Grading Agency: Certified by APA.

1.5 SUBMITTALS

- A. Submit standard colors and patterns of plastic laminate and solid surface material for Architect/Owner selection.
- B. Submit shop drawings for pre-fabricated cabinetry and custom countertops. Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver shop fabricated carpentry items until site conditions are adequate to receive the work. Protect items from weather while in transit.
- B. Store indoors, in ventilated areas with a constant, minimum temperature of 60 degrees F, maximum relative humidity of 25 to 55 percent.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Coordinate construction to ensure that the actual dimensions correspond to established dimensions. Provide fillers and scribes to allow for trimming and fitting.
- C. Field Measurements:
 - 1. For Cabinets: Where cabinets are indicated to fit existing construction, verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide filler and scribe if necessary.
 - 2. For Countertops: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8 COORDINATION

- A. Coordinate layout installation of blocking and reinforcement in partitions for support of cabinets.
- B. Coordinate the work with plumbing and electrical rough-in.

PART 2 PRODUCTS**2.1 ROUGH CARPENTRY MATERIALS**

- A. Lumber: PS 20; graded in accordance with established Grading rules; maximum moisture content of 15% - 19%; of the following species and grades.
 - 1. Non-Structural Light Framing and Blocking: Stress Group C; standard grade.
- B. Nails, Spikes and Staples: Galvanized for exterior locations. high humidity locations and treated wood; plain finish for other interior locations; size and type to suit application.
- C. Anchor Bolts, Nuts, Washers, Lags, Pins and Screws: Medium carbon steel; sized to suit application; galvanized for exterior locations, high humidity locations and treated wood; plain finish for other interior locations.
- D. Firestopping: Thermafiber mineral firesafing insulation as manufactured by US Gypsum Co. or approved equal.

2.2 LUMBER MATERIALS

- A. Interior Softwood Lumber: PS 20; graded in accordance with AWI, maximum moisture content species and grades.

ITEM	SPECIES	GRADE
Wood Casing/Trim	Poplar	Paint Grade

2.3 FINISH TRIM AND WOODWORK

- A. Interior Hardwood Lumber: Oak Species; graded in accordance with requirements of AWI Custom; maximum moisture content of 6% suitable for transparent finish.
 - 1. Sizes: 1 x 6; length as indicated on Drawings.

2.4 WOOD TREATMENT

- A. Wood Preservative Pressure Treatment: AWWA Treatment C1 using water borne preservative with 0.25 percent retainage.
- B. Shop pressure treat and deliver to site ready for installation wood materials requiring pressure impregnated preservatives.

2.5 COUNTERTOPS, CASEWORK MATERIAL AND MISCELLANEOUS ACCESSORIES

- A. Wood Particleboard: 45# per AWI standard, composed of wood chips, made with high waterproof resin binders of grade to suit application, standard faces, located as follows:

ITEM

Drawer Construction
Cabinet Doors, Sides and Bottoms
Shelving
Countertops
Cabinet Backs

- B. Plastic Laminate: NEMA LD 3-1985, GP 50 grade, .050 inch thick, general purpose (as manufactured by Formica or approved equal). (All doors, drawers, counters, backsplashes, etc.) Four possible colors as selected by Architect.
- C. Plastic Laminate Backing Sheet: LD 3 BK-20 backing grade, 0.020 inch thick, smooth surface finish, undecorated (all concealed locations).
- D. Cabinet Liner: CL 20 grade, 0.020 inch thick, all interior casework surfaces.
- E. Adhesive: FS MMM-A-130. Type recommended by laminate manufacturer to suit application.
- F. Fasteners: Size and type to suit application.
- G. Bolts, Nuts, Washers, Lags, Pins and Screws: Of size and type to suit application.
- H. Shelf Standards: Stanley 1805 aluminum mortise mounted, size as appropriate per application.
- I. Shelf Clips: Stanley CD 1806 steel, bright zinc plated.
- J. Drawer Slides: Blum BS 426A (full extension), size as required.
- K. Hinges: Stanley #1501-2 (self-closing) quantity per door as recommended by manufacturer.

2.6 FABRICATION (CABINET WORK)

- A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
- B. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- C. Door and Drawer Fronts: 3/4 inch thick; overlay style.
- D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- E. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
- F. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
- G. Provide cutouts for plumbing fixtures, inserts, appliances, fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal contact surfaces of cut edges.
- H. All countertops to be 1-1/2" edge unless noted otherwise.
- I. Form joints between components using manufacturer's standard joint adhesive. Joints shall be inconspicuous in appearance and without voids.

SECTION 060010 - CARPENTRY WORK

- J. Rout and finish component edges to a smooth, uniform finish. Rout all cutouts, then sand all edges smooth. Repair or reject defective or inaccurate work.

2.7 ACCESSORIES

- A. Cabinet Pulls: Stanley 4484, US26D, 4" wire pull.
- B. Coat Hooks: See Drawings.

2.8 SOLID SURFACE

- A. DuPont Corian Surfacing.
- B. Substitutions: Under provisions of Division 1 – General Requirements.

2.9 MATERIALS

- A. 33% Binding resins, 66% minerals.
- B. ½" Thick material as shown on Drawings and as required.
- C. Colors: to be selected from manufacturer's full color range; Assume two (2) colors.
- D. Edge Detail: Basic eased edge.

2.10 LOCKERS

- A. Manufacturer: List Industries – Heavy Duty Corridor KD Locker; size and quantity indicated on Drawings.
 - 1. Doors: 14 gauge cold rolled steel with 3" louvers as shown on Drawings.
 - 2. Frame: 16 gauge cold rolled steel; solid.
 - 3. Tops: 24 gauge cold rolled steel; solid.
 - 4. Bottoms: 16 gauge cold rolled steel; solid; including hat shelf.
 - 5. Shelves: 16 gauge cold rolled steel; solid.
 - 6. Sides: 24 gauge cold rolled steel; solid.
 - 7. Back: 24 gauge cold rolled steel; solid.
 - 8. Handles: Stainless steel; lift (recessed drawn handle).
 - 9. Hinge: 16 gauge cold rolled steel; continuous piano type.
 - 10. Color: To be selected by Architect.
 - 11. Latching: Three point recessed; automatic locking device with lift-type padlock hasp.
- B. Provide Z-Base and Continuous Slope top.

PART 3 EXECUTION

3.1 FINISH CARPENTRY

- A. Verify adequacy of backing and support framing.
- B. Install work in accordance with AWI Custom Quality Standards.
- C. Set and secure materials and components in place, plumb and level.

SECTION 060010 - CARPENTRY WORK

- D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- E. Install trim with nails and glue. Picture frame window openings.
- F. Ensure that mechanical, electrical and building items affecting this section of work are properly placed, complete and have been inspected by the Architect prior to commencement of installation.
- G. All fasteners exposed to view are to be concealed.
- H. Permanently fix counter bases to floor using appropriate angles and anchorages.
- I. Install and adjust cabinet hardware to correct operation.
- J. Install hardware, fixtures and accessories supplied under other sections. Install items in accordance with manufacturer's instructions.
- K. Protect surfaces from damage until project completion. Repair/replace damaged work.
- L. Keep components clean during installation. Remove adhesives, sealants and other stains.
- M. Solid surface fabrications to be performed by a certified Corian fabricator/installer.

3.2 PREPARATION OF SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentation, sand work smooth.

3.3 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.

3.4 SCHEDULES

- A. Rough Carpentry:
 - 1. Miscellaneous Furring and Stripping for Walls.
 - 2. Behind Wall Wood Blocking for Support of Accessories, Shelving, Counters and Cabinets.
- B. Interior Finish Carpentry:
 - 1. Custom cabinetry, countertops, and backsplashes.
 - 2. Floating Prefinished Wood Shelves: see Drawings.
 - 3. Oak Trim with coat hooks: Stained with prefinished coat hooks.
 - 4. Interior wood casing: sizes and profiles to match existing and as indicated on Drawings: Painted.
 - 5. Prefabricated bullet resistant transaction windows: See Drawings.
 - 6. Lockers: Prefinished
 - 7. Prefabricated bullet resistant fixed window unit: See Drawings.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Sound attenuating batt insulation in interior walls.

PART 2 PRODUCTS

2.1 MANUFACTURERS - INSULATION MATERIALS

- A. Certaineed Product – Noise Reducer Sound Attenuation and Acoustical Ceiling Batts.
- B. Substitutions: Under provisions of Division 1 - General Requirements.

2.2 MATERIALS

- A. Sound Attenuating Batt Insulation: ASTM C665; preformed glass fiber batt roll type; unfaced.
- B. Nails or Staples: Steel wire; electroplated; type and size to suit application.
- C. Support Wire Fasteners: Galvanized rigid wire with pointed ends.
- D. Tape: Mesh reinforced, 2 inch wide.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install insulation in accordance with insulation manufacturer's instructions.
- B. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- C. Tape, seal butt ends lapped flanges and tears or cuts in membrane.

3.2 SCHEDULES

- A. Interior Walls (Acoustical): 3-1/2" and 6" thick; unfaced; 16" wide.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Preparing substrate surfaces.
- B. Sealant and joint backing.

1.2 RELATED SECTIONS

- A. Section 060010 - Carpentry Work: Sealants required in conjunction with cabinetry /countertops.

1.3 REFERENCES

- A. ASTM C790 - Use of Latex Sealing Compounds.
- B. ASTM C804 - Use of Solvent-Release Type Sealants.
- C. ASTM C834 - Latex Sealing Compounds.
- D. ASTM C919 - Use of Sealants in Acoustical Applications.
- E. ASTM C920 - Elastomeric Joint Sealants.
- F. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
- G. ASTM D1565 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Open-Cell Foam).
- H. SWRI (Sealant, Waterproofing and Restoration Institute) - Sealant and Caulking Guide Specification.

1.4 SUBMITTALS

- A. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- B. Samples: Submit two samples, illustrating sealant colors for selection.
- C. Manufacturer's Installation Instructions: Indicate special procedures, surface preparation, and perimeter conditions requiring special attention.

1.5 QUALITY ASSURANCE

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

1.6 QUALIFICATIONS

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

- B. Applicator: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

1.7 ENVIRONMENTAL REQUIREMENTS

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

1.8 COORDINATION

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

1.9 WARRANTY

- A. Provide a five year warranty.
- B. Warranty: Include coverage for installed sealants and accessories which fail to achieve air tight seal, water tight seal, and exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 SEALANTS

	<u>Location</u>	<u>Type</u>	<u>Color</u>
A.	Solid Surface Counter Backsplash	Silicone Single Component	Clear
B.	Door Frame/Walls	Acrylic, Latex	Paint to match
C.	Fire Stop Sealant	One part silicone Elastomer (Dow Corning Fire Stop Sealant)	Grey

2.2 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: ASTM D1056; round, closed foam rod; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrate surfaces and joint openings are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

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

3.3 INSTALLATION

- A. Install sealant in accordance with manufacturer's instructions.
- B. Measure joint dimensions and size materials to achieve required 2:1 width/depth ratios.
- C. Install joint backing to achieve a neck dimension no greater than 1/3 of the joint width.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave.

3.4 CLEANING

- A. Clean adjacent soiled surfaces.

3.5 PROTECTION OF FINISHED WORK

- A. Protect finished installation.
- B. Protect sealants until cured.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Non-rated steel door frames.

1.2 RELATED SECTIONS

- A. Section 060010 - Carpentry Work.
- B. Section 082110 - Wood Doors.
- C. Section 092600 - Gypsum Wall Board.
- D. Section 099000 - Painting: Field painting of frames.

1.3 REFERENCES

- A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- B. ANSI/SDI-100 - Standard Steel Doors and Frames.
- C. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- D. DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

1.4 SUBMITTALS

- A. Shop Drawings: Indicate frame elevations, reinforcement, and finish.
- B. Product Data: Indicate frame configuration, anchor types and spacings, location of cut-outs for hardware, reinforcement.
- C. Manufacturer's Installation Instructions: Indicate special installation instructions.
- D. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Conform to requirements of ANSI/SDI-100 and ANSI A117.1.

1.6 QUALIFICATIONS

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

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site.
- B. Accept frames on site in manufacturer's packaging. Inspect for damage.

1.8 FIELD MEASUREMENTS

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

1.9 COORDINATION

- A. Coordinate the work with frame opening construction, door and hardware installation.

PART 2 PRODUCTS**2.1 FRAME MANUFACTURERS**

- A. Pioneer Product: Series F.

2.2 FRAMES

- A. Interior Frames: 16 gage thick material, base metal thickness.

2.3 ACCESSORIES

- A. Silencers: Resilient rubber, fitted into drilled hole.
- B. Removable Stops: Rolled steel channel shape, mitered corners; prepared for countersink style tamper proof screws.
- C. Primer: Baked enamel/zinc chromate type.
- D. Frame Anchors: Metal stud frame anchors as required to suit application.

2.4 FABRICATION

- A. Fabricate interior frames for knock-down field assembly.
- B. Fabricate frames with hardware reinforcement plates welded in place.
- C. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
- D. Prepare frame for silencers. Provide three single silencers for single doors on strike side. Provide two single silencers on frame head at double doors without mullions.
- E. Jamb depth as indicated on Drawings and to suit application.

2.5 FINISH

- A. Steel Sheet: Cold rolled conforming to ASTM A366.
- B. Primer: Baked / air dried.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Install frames in accordance with ANSI/SDI-100 and DHI.
- B. Coordinate with metal stud framing and wallboard wall construction for anchor placement.
- C. Coordinate installation of frames with installation of doors specified in Section 081110 and hardware as indicated on Drawings.
- D. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

3.3 ERECTION TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

END OF SECTION

PART1 GENERAL

1.1 SECTION INCLUDES

- A. Flush wood doors; non-rated.

1.2 RELATED SECTIONS

- A. Section 081120 - Standard Steel Frames.

1.3 REFERENCES

- A. ANSI/HPMA HP - Hardwood and Decorative Plywood.
- B. ASTM E413 - Classification for Determination of Sound Transmission Class.
- C. AWI - Quality Standards of the Architectural Woodwork Institute.

1.4 SUBMITTALS

- A. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, identify cutouts for hardware, glazing, etc.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics; and factory machining criteria.
- C. Samples: Submit two samples of door veneer, 4 x 4 inch in size illustrating wood grain, stain color, and sheen.
- D. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with AWI Quality Standard Section 1300, Premium Grade.
- B. Finish doors in accordance with AWI Quality Standard Section 1500.

1.6 QUALIFICATIONS

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

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site.
- B. Package, deliver and store doors in accordance with AWI Section 1300.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges if stored more than one week. Break seal on-site to permit ventilation.

1.8 FIELD MEASUREMENTS

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

1.9 COORDINATION

- A. Coordinate the work with door opening construction, door frame and door hardware installation.

1.10 WARRANTY

- A. Provide warranty.
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Doors:
 - 1. VT Industries Heritage Collection Architectural Wood Doors.
 - 2. Substitutions: Under provisions of Division 1- General Requirements.

2.2 DOOR TYPES

- A. Flush Interior Doors: 1-3/4" thick; solid core and hollow core construction; non-rated.

2.3 DOOR CONSTRUCTION

- A. Core: Solid, non-rated core, AWI, Section 1300.
- B. SRC-Stile and rail, particle core, bonded to stiles and rails.
- C. 5-Ply construction.

2.4 DOOR FACING

- A. Veneer Facing: AWI Custom quality, Premium White Oak; plain sliced; book and running match; pre-finished. Color to be selected from manufacturer's full standard color range.

2.5 ADHESIVE

- A. Facing Adhesive: Type II - water resistant.

2.6 FABRICATION

- A. Fabricate non-rated doors in accordance with AWI Quality Standards requirements.
- B. Vertical Exposed Edge of Stiles: Of same species as veneer facing. Hardwood for transparent finish facing.
- C. Fit door edge trim to edge of stiles after applying veneer facing.
- D. Bond edge banding to cores.

- E. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.

2.7 FINISH

- A. Factory finish; color to be selected by Architect.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Install doors in accordance with AWI Quality Standards.
- B. Trim door width by cutting equally on both jamb edges.
- C. Trim door height by cutting bottom edges to a maximum of 3/4 inch.
- D. Pilot drill screw and bolt holes.
- E. Machine cut for hardware. Core for handsets and cylinders.
- F. Coordinate installation of doors with installation of frames.

3.3 INSTALLATION TOLERANCES

- A. Conform to AWI requirements for fit and clearance tolerances.
- B. Conform to AWI Section 1300 requirements for maximum diagonal distortion.

3.4 ADJUSTING

- A. Adjust door for smooth and balanced door movement.

3.5 SCHEDULE

- A. See Drawings.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glass and glazing for transaction windows and borrowed lites.

1.2 RELATED SECTIONS

- A. Section 079000 - Joint Sealers: Sealant and back-up material.
- B. Section 082110 - Wood Doors.

1.3 REFERENCES

- A. ANSI/ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- B. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
- C. ASTM C1036 - Flat Glass.
- D. ASTM C1048 - Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
- E. FGMA - Glazing Manual.
- F. FGMA - Sealant Manual.
- G. FS TT-S-001657 - Sealing Compound, Single Component, Butyl Rubber Based, Solvent Release Type.
- H. FS TT-S-00230 - Sealing Compounds, Synthetic-Rubber Base, Single Component, Chemically Curing.
- I. FS TT-S-01543 - Sealing Compound, Silicone Rubber Base.
- J. Laminators Safety Glass Association - Standards Manual.

1.4 PERFORMANCE REQUIREMENTS

- A. Glass and glazing materials of this Section shall provide continuity of building enclosure vapor and air barrier:
 - 1. In conjunction with materials described in Section 07900.
 - 2. Maintain continuous air and vapor barrier throughout glazed assembly from glass pane to heel bead of glazing sealant.
- B. Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass as calculated in accordance with applicable code in accordance with ANSI/ASTM E330.
- C. Limit glass deflection to 1/200 or flexure limit of glass with full recovery of glazing materials, whichever is less.

SECTION 088000 - GLAZING

1.5 SUBMITTALS

- A. Submit under provisions of Division 1 - General Requirements.
- B. Product Data on Glass Types Specified: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- D. Manufacturer's Installation Instructions: Indicate special precautions required.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with FGMA Glazing Manual FGMA Sealant Manual for glazing installation methods.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not install glazing when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.8 FIELD MEASUREMENTS

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

1.9 COORDINATION

- A. Coordinate Work under provisions of Division 1 - General Requirements.
- B. Coordinate the Work with glazing frames, wall openings, and perimeter air and vapor seal to adjacent Work.

1.10 WARRANTY

- A. Provide five year manufacturer's warranty under provisions of Division 1 - General Requirements.
- B. Warranty: Include coverage for reflective coating on mirrors and replacement of same.

PART 2 PRODUCTS

2.1 MANUFACTURERS - FLAT GLASS MATERIALS

- A. Total Security Solutions.
- B. Substitutions: Under provisions of Division 1 - General Requirements.

SECTION 088000 - GLAZING

2.2 FLAT GLASS MATERIALS

- A. Bullet Resistant Glazing: TSS 003 Laminated Polycarbonate; 1 ¼" THK. POLY/ACRYLIC; Model # O-GLZ-PLY-1005-T; U.L. 752; Level 3; ASTM F1233; Layer 1 – Mar Resistant Polycarbonate, Layer 2 – Interlayer, Layer 3 – Acrylic, Layer 4 – Interlayer, Layer 5 – Mar Resistant Polycarbonate. **Type G-1.**

2.3 GLAZING COMPOUNDS

- A. Acrylic Sealant: FS TT-S-00230, Type II, Class A; single component; cured Shore A hardness of 15- 25 non-bleeding color as selected.

2.4 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene 80 - 90 Shore A durometer hardness, length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene 50 - 60 Shore A durometer hardness, minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify prepared openings under provisions of Division 1 - General Requirements.
- B. Verify that openings for glazing are correctly sized and within tolerance.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.

3.3 INTERIOR - DRY METHOD (TAPE AND TAPE)

- A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
- C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
- D. Place glazing tape on free perimeter of glazing in same manner described above.
- E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

SECTION 088000 - GLAZING

- F. Knife trim protruding tape.

3.4 EXTERIOR - WET/DRY METHOD

- A. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with sealant.
- B. Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corner.
- D. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.
- E. Install removable stops, with spacer strips inserted between glazing and applied stops, 1/4 inch below sight line.
- F. Fill gap between glazing stop with sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.
- G. Apply cap bead of sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.5 CLEANING

- A. Clean work under provisions of Division 1 - General Requirements.
- B. Remove glazing materials from finish surfaces.
- C. Remove labels after work is complete.

3.6 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Division 1 - General Requirements.
- B. After installation, mark pane with an 'X' by using removable plastic tape or paste.

END OF SECTION

SECTION 092600 - GYPSUM BOARD SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal stud wall framing and furring.
- B. Gypsum Board.
- C. Taped and sanded joint treatment.
- D. Accessories.

1.2 RELATED SECTIONS

- A. Section 060010 - Carpentry.
- B. Section 081120 - Standard Steel Frames.
- C. Section 099000 - Painting: Surface finish.
- D. Division 23 - Mechanical.
- C. Division 26 - Electrical.

1.3 REFERENCES

- A. ASTM C36 - Gypsum Wallboard.
- B. ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction.
- C. ASTM C630 - Water Resistant Gypsum Backing Board.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C840 and GA-600.

1.5 QUALIFICATIONS

- A. Applicator: Company specializing in performing the work of this section with minimum 3 years documented experience.

PART 2 PRODUCTS

2.1 MANUFACTURERS - GYPSUM BOARD SYSTEM

- A. Georgia-Pacific Gypsum Products.
- B. Substitutions: Under provisions of Division 1 – General Requirements.

SECTION 092600 - GYPSUM BOARD SYSTEMS

2.2 GYPSUM BOARD MATERIALS

- A. Standard Gypsum Board: ASTM C36; 5/8" thick, maximum permissible length; ends square cut, tapered edges.

2.3 FRAMING MATERIALS

- A. Studs and Tracks - Interior Partitions: ASTM C645; galvanized sheet steel, 3-5/8" and 6", 20 gage thick, C shape with knurled faces.
- B. Joists-Interior Ceilings/Soffits: ASTM C645; galvanized sheet steel, 3 5/8 or 6", 20 gage thick, C shape with knurled faces.
- C. Stud Furring-Interior Walls: ASTM C645; galvanized sheet steel; 1-1/2", 25 gage thick hat channels or 2 1/2", 22 gage thick studs.
- D. Vertical Slide Clip: Galvanized sheet steel, 12 gage thick.
- E. Fasteners: ASTM C514.
- F. Anchorage to Substrate: Tie wire, nails, screws and other metal supports, of type and size to suit application; to rigidly secure materials in place.
- G. Adhesive: ASTM C557.

2.4 ACCESSORIES

- A. Corner Beads: Metal.
- B. Joint Materials: ASTM C475; reinforcing tape, joint compound, adhesive, and water.
- C. Fasteners: ASTM C1002.
- D. Reveals: Pittcon STR Series trim reveal; STR-063-063; 5/8" wide x 5/8" deep; aluminum extrusion; painted

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions.
- B. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

3.2 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with GA-201, GA-216 and GA-600.

SECTION 092600 - GYPSUM BOARD SYSTEMS

- B. Erect single layer standard gypsum board in most economical direction, with ends and edges occurring over firm bearing. Provide double layer at rated partitions; install in accordance with approved assembly.
- C. Use screws when fastening gypsum board to wood stud or framing.
- D. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.
- E. Remove and redo defective work.

3.3 JOINT TREATMENT

- A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
- B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.
- C. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.

3.4 METAL STUD INSTALLATION

- A. Install studs in accordance with ASTM C754, and manufacturer's instructions.
- B. Metal Stud Spacing: 16 inches and 24 inches on center, as indicated on drawings.
- C. Door Opening Framing: Install double studs at door frame jambs. Install stud tracks on each side of opening, at frame head height, and between studs and adjacent studs.
- D. Blocking: Screw fire retardant treated wood blocking and steel channels to studs. Install blocking for support of wall cabinets, hardware, and other items.

3.5 CEILING/SOFFIT FRAMING

- A. Install C Sections in accordance with ASTM C754 and manufacturer's instructions.

3.6 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Porcelain tile floor finish installed using the thinset application method.
- B. Ceramic wall tile installed using the thinset application method.
- C. Porcelain tile floor finish in full mud bed in shower area.
- D. Thresholds at door openings.
- E. Accessories.

1.2 RELATED SECTIONS

- A. Section 060010 - Carpentry.
- B. Section 079000 - Joint Sealers.
- C. Section 092600 - Gypsum Board Systems.

1.3 REFERENCES

- A. ANSI A108.5 - Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.
- B. ANSI A108.10 - Installation of Grout in Tilework.
- C. ANSI A118.4 - Bonding Mortars.
- D. ANSI A118.6 - Ceramic Tile Grouts.
- E. ANSI A137.1 - Standard Specifications for Ceramic Tile.
- F. TCA (Tile Council of America) - Handbook for Ceramic Tile Installation.

1.4 SUBMITTALS

- A. Submit under provisions of Division 1 - General Requirements.
- B. Product Data: Provide instructions for using adhesives and grouts.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 MAINTENANCE DATA

- A. Submit under provisions of Division 1 - General Requirements.
- B. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ANSI A137.1.
- B. Conform to TCA Handbook, ANSI A108.5 and ANSI A108.4.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing the work of this section with minimum 3 years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 1 - General Requirements.
- B. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not install adhesives in an unventilated environment.
- B. Maintain 50 degrees F during installation of mortar materials.

1.10 EXTRA MATERIALS

- A. Furnish under provisions of Division 1 - General Requirements.
- B. Provide 20 s.f. of each size, color, and surface finish of tile specified.

PART 2 PRODUCTS**1.11 TILE MANUFACTURERS**

- A. Dal-Tile.
- B. Substitutions: Under provisions of Division 1 - General Requirements.

1.12 CERAMIC TILE MATERIALS

- A. Ceramic Wall Tile: FloridaTile - Alustra; ANSI A137.1, conforming to the following:
 - 1. Moisture Absorption 7% < Value ≤ 20%
 - 2. Shape Rectangle
 - 3. Edge Rectified
 - 4. Size 24" x 48"
 - 5. Surface Finish Polished
 - 6. Color Opulant Beige Onyx – ALU3OP

- B. Ceramic Wall Tile Cap: FloridaTile - Alustra; TCA A137.1, conforming to the following:

1.	Moisture Absorption	7% < Value ≤ 20%
2.	Shape	Rectangle Bullnose (P43N9)
3.	Size	3" x 24"
4.	Edge	Rectified
5.	Surface Finish	Polished
6.	Color	Opulant Beige Onyx – ALU3OP

2.3 MORTAR MATERIALS

- A. Mortar Materials: ANSI A118.1 Dry Set, ANSI A118.4 Latex Modified, Portland cement, sand, latex additive, and water.

2.4 GROUT MATERIALS

- A. Grout: ANSI A118.6, latex - Portland cement grout, colors as selected by Architect.

2.5 MORTAR MIX AND GROUT MIX

- A. Mix and proportion pre-mix setting bed and grout materials with additives in accordance with manufacturer's instructions. and TCA Handbook.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify substrate under provisions of Division 1 - General Requirements.
- B. Verify that surfaces are ready to receive work.

3.2 PREPARATION

- A. Protect surrounding work from damage or disfiguration.
- B. Vacuum clean surfaces and damp clean, if required.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Apply sealer to substrate surfaces in accordance with adhesive manufacturer's instructions.

3.3 INSTALLATION - THINSET METHOD

- A. Install adhesive, tile, and grout in accordance with manufacturer's instructions and to TCA Handbook.
- B. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly.
- C. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

- D. Sound tile after setting. Replace hollow sounding units.
- E. Allow tile to set for a minimum of 48 hours prior to grouting.
- F. Grout tile joints.
- G. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.
- H. Comply with ANSI A108.5 and TCA for appropriate method of installation. Press and beat tile into place to obtain as near 100% coverage as possible.

3.4 CLEANING

- A. Clean work under provisions of Division 1 - General Requirements.
- B. Clean tile and grout surfaces.

3.5 PROTECTION OF FINISHED WORK

- A. Protect finished work under provisions of Division 1 - General Requirements.
- B. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Suspended metal grid ceiling system and perimeter trim.
- B. Acoustical tile.

1.2 REFERENCES

- A. ASTM C635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- B. ASTM C636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
- C. ASTM E1264 - Classification of Acoustical Ceiling Products.
- D. Ceilings and Interior Systems Contractors Association (CISCA) - Acoustical Ceilings: Use and Practice.

1.3 SYSTEM DESCRIPTION

- A. Suspension system to rigidly secure acoustical ceiling system including integral mechanical and electrical components with maximum deflection of 1/360.

1.4 SUBMITTALS

- A. Submit under provisions of Division 1 - General Requirements.
- B. Product Data: Provide data on metal grid system components and acoustical units.
- C. Samples: Submit two samples full size illustrating material and finish of acoustical units.
- D. Samples: Submit two samples each, of suspension system main runner, cross runner, and edge trim.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.5 QUALIFICATIONS

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

1.6 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for combustibility requirements for materials.

1.7 ENVIRONMENTAL REQUIREMENTS

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

1.8 SEQUENCING

- A. Sequence work under the provisions of Division 1 - General Requirements.
- B. 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.
- C. Install acoustical units after interior wet work is dry.

1.9 EXTRA MATERIALS

- A. Furnish under provisions of Division 1 - General Requirements.
- B. Provide two unopened boxes of each tile to Owner.

PART 2 PRODUCTS**2.1 MANUFACTURERS - SUSPENSION SYSTEM**

- A. Armstrong Contract Interiors.
- B. Substitutions: Under provisions of Division 1 - General Requirements.

2.2 SUSPENSION SYSTEM MATERIALS

- A. Non-fire Rated Grid: ASTM C635, intermediate duty; exposed T; components die cut and interlocking; hot dipped galvanized. Product: Prelude 15/16" T-bar grid suspension system.
- B. Grid Finish: Prelude 15/16" Grid - White.
- C. Accessories: Stabilizer bars, hold-down clips, splices, edge and moldings required for suspended grid system.
- D. Support Channels and Hangers: Hot dipped galvanized; size and type to suit application and ceiling system flatness requirement specified.

2.3 MANUFACTURERS - ACOUSTICAL UNITS

- A. Armstrong Contract Interiors.
- B. Substitutions: Under provisions of Division 1 - General Requirements.

2.4 ACOUSTICAL UNIT MATERIALS

- A. Acoustical Tile – Armstrong Bevelled Tegular Ultima High NRC No. 2084; conforming to the following:
 - 1. Size: 24 x 48 inches.

2. Thickness: 1 inch.
3. Composition: Wet-formed mineral fiber.
4. NRC Range: 0.85
5. CAC Range: 35
6. Edge Detail: Bevelled tegular lay-in.
7. Surface Burning Characteristics: Flame spread 25 or under.
8. Grid: 15/16 inch.
9. Color: White.
10. Factory applied vinyl latex paint.
11. Humidity Resistance: Humiguard Plus.

2.5 ACCESSORIES

- A. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Division 1 - General Requirements.
- B. Verify that layout of hangers will not interfere with other work.

3.2 INSTALLATION - LAY-IN GRID SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636 and manufacturer's instructions and as supplemented in this section.
- B. Install system capable of supporting imposed loads to a deflection of 1/360 maximum.
- C. Locate system on room axis according to reflected ceiling plan.
- D. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.
- E. 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.
- F. 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.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Do not eccentrically load system, or produce rotation of runners.
- I. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.

3.3 INSTALLATION - ACOUSTICAL UNITS

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

SECTION 095110 - SUSPENDED ACOUSTICAL CEILINGS

- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Lay directional patterned units one way with pattern parallel to room axis. Fit border trim neatly against abutting surfaces.
- D. Install units after above ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp and dents.
- F. Cut tile to fit irregular grid and perimeter edge trim. Field rabbet tile edge. Double cut and field paint exposed edges of tegular units.

3.4 ERECTION TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Resilient base.
- C. Accessories

1.2 RELATED SECTIONS

- A. Section 096880 - Carpet.

1.3 REFERENCES

- A. ASTM E648 - Critical Radiant Flux - Class 1.
- B. ASTM E 662 - Smoke - 450 or less.
- C. ASTM F1066 - Vinyl Composition Floor Tile.
- D. FS-SS-W-40 - Wall Base: Rubber and vinyl plastic.

1.4 SUBMITTALS

- A. Submit under provisions of Division 1 - General Requirements.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.
- C. Samples: Submit two samples, 2 x 2 inch in size illustrating color and pattern for each floor material for each color specified.
- D. Submit two inch long samples of base material for each color specified.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 1 - General Requirements.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Store materials for three days prior to installation in area of installation to achieve temperature stability.
- B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

SECTION 096500 - RESILIENT FLOORING

1.7 MAINTENANCE DATA

- A. Submit under provisions of Division 1 - General Requirements.
- B. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.8 EXTRA MATERIALS

- A. Furnish under provisions of Division 1 - General Requirements.
- B. Provide 20 sq ft of flooring and 20 lineal feet of base of each material specified.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. LVT: Tarkett
- B. Vinyl Base: Roppe.
- C. Substitutions: Under provisions of Division 1 - General Requirements.

2.2 LUXURY VINYL TILE

- A. Luxury Vinyl Tile: ASTM E648:
 - 1. Size: 12" x 36"
 - 2. Thickness: 3 mm
 - 3. Wear Layer: 32 mil
 - 4. Design: Non-directional
 - 5. Manufacturer: Tarkett – Glint
 - 6. Finish: Techtonic.
 - 7. Color: Ice Core - 10373
 - 8. Pattern: Vertical Ashlar
 - 9. Installation: Glue Down

2.3 MATERIALS - BASE

- A. Base: Standard vinyl wall base, coved:
 - 1. Height: 4 inch
 - 2. Thickness: 1/8 inch thick
 - 3. Length: Roll (120 feet)
 - 4. Manufacturer: Roppe
 - 5. Color: as selected by Architect (Assume 2 colors).

2.4 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
- C. Sealer and Wax: Types recommended by flooring manufacturer.
- D. Transition Strips: As required to accommodate changes in flooring materials. Colors as

SECTION 096500 - RESILIENT FLOORING

selected by Architect.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify concrete floors are dry to a maximum moisture content of 7 percent, and exhibit negative alkalinity, carbonization, or dusting.
- B. Verify floor and lower wall surfaces are free of substances that may impair adhesion of new adhesive and finish materials.

3.2 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- B. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.
- D. Apply primer to required surfaces.

3.3 INSTALLATION - TILE FLOORING

- A. Install in accordance with manufacturer's instructions.
- B. Spread only enough adhesive to permit installation of materials before initial set.
- C. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile.
- E. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.
- F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- G. Install LVT plank in accordance with manufacturer's instructions and in patterns selected or specified.

3.4 INSTALLATION - BASE

- A. Fit joints tight and vertical. Maintain maximum measurement 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 pre-molded units.
- C. Install base on solid backing. Bond tight to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.5 CLEANING

- A. Clean work under provisions of Division 1 - General Requirements.

SECTION 096500 - RESILIENT FLOORING

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

3.6 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Division 1 - General Requirements.
- B. Prohibit traffic on floor finish for 48 hours after installation.

3.7 SCHEDULE

- A. See Finish Schedule for locations.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Carpet tile placed with glue-down method.
- B. Walk-off carpet tile placed with glue down method.
- C. Accessories.

1.2 RELATED SECTIONS

- A. Section 096500 - Resilient Flooring: resilient tile flooring; base and accessories.

1.3 REFERENCES

- A. ASTM D2859 - Test Method for Flammability of Finished Textile Floor Covering Materials.
- B. ASTM E84 - Surface Burning Characteristics of Building Materials.
- C. ASTM E648 - Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
- D. NFPA 253 - Test for Critical Radiant Flux of Floor Covering Systems.

1.4 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- B. Samples: Submit two samples 6 x 6 inch in size illustrating color and pattern for each carpet material specified.
- C. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

1.5 QUALIFICATIONS

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

1.6 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for flame/smoke rating requirements in accordance with ASTM E84.
- B. Conform to ASTM D2859 for surface flammability ignition test.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Store materials for 3 days prior to installation in area of installation to achieve temperature stability.
- B. Maintain minimum 70 degrees F ambient temperature 3 days prior to, during and 24 hours after installation.

1.8 MAINTENANCE DATA

- A. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.9 EXTRA MATERIAL

- A. Provide a total of 90 sq ft of carpeting of main type, color, and pattern specified.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS – CARPETING

- A. Tarkett Commercial – Carpet Tile
- B. Mannington - Commercial Flooring – Walk-off Carpet Tile.
- C. Substitutions: Under provision of Division 1 - General Requirements.

2.2 MATERIALS - CARPET TILE

- A. Carpet Tile # 1: Tarkett Light Shift Collection – Light Shift – 11524; solution dyed; 18" x 36"; color to be Ice Core - 45404; installation method – Vertical Ashlar.

2.3 MATERIALS – WALK–OFF CARPET TILE

- A. Mannington – Ruffian II; 24" x 24" modular carpet tile, Infinity Modular backing; 38 oz. face weight; post production type 6, 6 solution dyed nylon plus scraper fiber; color as selected by Architect. (Assume 1 color)
- B. Installation Method: Monolithic

2.4 ACCESSORIES

- A. Sub-Floor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Adhesive: Recommended and supplied by carpet manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are smooth and flat with maximum variation of 1/4 inch in 10 ft, and

are ready to receive work.

3.2 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.

3.3 INSTALLATION

- A. Install carpet tile and walk-off carpet tile and adhesive in accordance with manufacturers' instructions.
- B. Lay carpet tile and walk-off carpet tile tight and flat, well fastened at edges, with a uniform appearance. Provide monolithic color, pattern, and texture match within any one area.
- C. Install in patterns specified.
- D. Cut and fit carpet tile and walk-off carpet tile around interruptions.
- E. Fit carpet tile and walk-off carpet tile tight to intersection with vertical surfaces without gaps.
- F. Provide carpet tile in areas indicated on Finish Schedule.

3.4 CLEANING

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

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Surface preparation and field application of paints and coatings.
- B. Related Sections:
 - 1. Section 060010 – Carpentry Work
 - 2. Section 081120 – Standard Steel Frames
 - 3. Section 092600 – Gypsum Board Systems

1.2 REFERENCES

- A. ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
- B. Conform to ASTM D16 for interpretation of terms used in this Section.

1.3 SUBMITTALS

- A. Product Data: Provide data on all finishing products and special coatings.
- B. Samples: Submit samples illustrating range of colors and textures available for each surface finishing product scheduled.
- C. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.
- D. Manufacturer's Safety Data Sheet (MSDS) for each product used.

1.4 QUALITY ASSURANCE

- A. Single Source
 - 1. Provide primers and other undercoat paints produced by same manufacturer as finish coats for each application.
 - 2. Use only thinners approved by paint manufacturer and use only with recommended limits.
- B. Coordination of Work
 - 1. Review other sections of these Specifications in which prime paints are to be provided, to ensure compatibility of total coatings system.
 - 2. Upon request from other trades, furnish information or characteristics of proposed finish materials, to ensure that compatible prime coats are used.

SECTION 099000 – PAINTS AND COATINGS

- C. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Applicator: Company specializing in performing the work of this section with minimum years documented experience and where applicable, approved by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Ambient temperature range for installation varies among manufacturers. Consult manufacturers for recommendations and revise first paragraph below to suit Project.
- B. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior, unless required otherwise by manufacturer's instructions.
- E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
- F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.7 EXTRA MATERIALS

- A. Provide 1 unopened gallon of each color, type, and surface texture to Owner.
- B. Label each container with color, type, texture, and room locations, in addition to the manufacturer's label.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Sherwin Williams
- B. Benjamin Moore
- C. PPG
- D. Or approved equal

SECTION 099000 – PAINTS AND COATINGS

2.2 MATERIALS

- A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating; good flow and brushing properties; capable of drying or curing free of streaks or sags.
- B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.3 FINISHES

- A. Refer to schedule at end of section for surface finish schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify site conditions.
- B. Verify that surfaces and substrate conditions are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. Test shop applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Interior Wood: 15 percent, measured in accordance with ASTM D2016.

3.2 PREPARATION

- A. Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- B. Correct defects and clean surfaces which affect work of this section.
- C. Seal with shellac and seal marks which may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.
- F. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

SECTION 099000 – PAINTS AND COATINGS

- G. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
- H. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
- I. Clean and prepare all surfaces in accordance with manufacturer's written specifications.

3.3 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry.
- C. Apply each coat to uniform finish.
- D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- E. Sand wood and metal lightly between coats to achieve required finish.
- F. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
- G. Allow applied coat to dry before next coat is applied.
- H. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- I. Prime concealed surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.
- J. Prime concealed surfaces of interior and exterior woodwork with primer paint.
- K. Existing/new metal siding must be free of all surface contamination such as oil, grease, loose paint, mill scale dirt, foreign matter, rust, mold, mildew, mortar and sealers to assure sound bonding. Glossy surfaces of old paint films must be clean and dull before repainting.
- L. Check for compatibility by applying a test patch of the recommended coating system, approximately 2-3 square feet. Allow to dry one week before testing adhesion per ASTM D3359. If coating system is incompatible, complete removal is required per ASTM D4259.

3.4 CLEANING AND PROTECTION

- A. Clean work.
- B. Collect waste material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

SECTION 099000 – PAINTS AND COATINGS

3.5 SCHEDULE - INTERIOR SURFACES

A. Miscellaneous Wood – Painted:

1. One coat of latex primer sealer: Sherwin Williams: Premium Wall & Wood Primer, B28W111.
2. Two coats of semi-gloss finish: Sherwin Williams: Promar 200 Zero VOC Interior Latex Semi-Gloss B31.2600. Assume two (2) colors.

B. Steel - Unprimed:

1. One coat of primer: Sherwin Williams: Pro Industrial Procryl Primer, B66-310.
2. Two coats of semi-gloss finish: Sherwin Williams: Pro Industrial HP Acrylic, B66-600. Assume two (2) colors.

C. Steel - Primed:

1. One coat of primer: Sherwin Williams: Pro Industrial Procryl Primer, B66-310.
2. Two coats of semi-gloss finish: Sherwin Williams: Pro Industrial HP Acrylic, B66-600. Assume two (2) colors.

D. Gypsum Board:

1. One coat of latex primer sealer, Sherwin Williams: Promar 200 Zero VOC Interior Latex Primer B28-2600.
2. Two coats of eggshell finish, Sherwin Williams: Promar 200 Zero VOC Interior Latex Eg-Shel, B20-2600. Assume three (3) colors.

E. Wood – Stained / Transparent

1. One coat sealer: Sherwin Williams Wood Classics Interior Wood Stain, A49.
2. Two coats varnish: Sherwin Williams Wood Classics Waterborne Polyurethane Varnish, A68.

Note: Provide stain samples for approval.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Mechanical sleeve seals.
 - 3. Sleeves.
 - 4. Escutcheons.
 - 5. Equipment installation requirements common to equipment sections.
 - 6. Supports and anchorages.

1.03 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
 - 1. CPVC: Chlorinated polyvinyl chloride plastic.
- G. The following are industry abbreviations for rubber materials:
 - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 2. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS

- A. Product Data: For the following:
 - 1. Mechanical sleeve seals.
 - 2. Escutcheons.

- B. Welding certificates.

1.05 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for Fire-Suppression Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

1.07 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for fire-suppression installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for fire-suppression items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

2.02 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 21 piping Sections for pipe, tube, and fitting materials and joining methods.

- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.03 JOINING MATERIALS

- A. Refer to individual Division 21 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.04 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - 1. Available Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 3. Pressure Plates: Stainless steel. Include two for each sealing element.
 - 4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.05 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - 1. Underdeck Clamp: Clamping ring with set screws.

2.06 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
 - 1. Finish: Polished chrome-plated.
- D. One-Piece, Stamped-Steel Type: With set screw spring clips set screw or spring clips and chrome-plated finish.
- E. One-Piece, Floor-Plate Type: Cast-iron floor plate.

2.07 GROUT

- A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.01 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 21 Sections specifying piping systems.
- B. 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, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

- D. 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.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - 1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - e. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - f. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
 - g. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- M. Sleeves are not required for core-drilled holes.
- N. Permanent sleeves are not required for holes formed by removable PE sleeves.
- O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.
 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- R. Verify final equipment locations for roughing-in.
- S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.02 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 21 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. 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 unless dry seal threading is specified.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

SECTION 210500 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.03 PAINTING

- A. Painting of fire-suppression systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.04 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

END OF SECTION 210500

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Pipes, fittings, and specialties.
 - 2. Sprinklers.

1.03 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175-psig maximum.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For wet-pipe sprinkler systems.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include diagrams for power, signal, and control wiring.
- C. Delegated-Design Submittal: Comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.05 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Domestic water piping.
 - 2. HVAC ductwork.
 - 3. Items penetrating finished ceiling include the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
- B. Qualification Data: For qualified Installer.

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

- C. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations.
- D. Welding certificates.
- E. Fire-hydrant flow test report.
- F. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
- G. Field quality-control reports.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.

1.07 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.08 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.
- B. Welding Qualifications: Qualify procedures and operators according to 2010 ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13.

- B. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- C. Delegated Design: Engage a qualified professional engineer, to design wet-pipe sprinkler systems.
 - 1. Contractor shall provide record flow test prior to and shop drawing design or submittals.
 - 2. Sprinkler system design shall be approved by authorities having jurisdiction.
 - a. Margin of Safety for Available Water Flow and Pressure: 20 percent, including losses through water-service piping, valves, and backflow preventers.
 - b. Sprinkler Occupancy Hazard Classifications:
 - 1) Building Service Areas: Ordinary Hazard, Group 1.
 - 2) Electrical Equipment Rooms: Ordinary Hazard, Group 1.
 - 3) General Storage Areas: Ordinary Hazard, Group 1.
 - 4) Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
 - 5) Office and Public Areas: Light Hazard.
 - 6) Food Service Areas: Ordinary Hazard, Group 1.
 - 3. Minimum Density for Automatic-Sprinkler Piping Design:
 - a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft.
 - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft.
 - 4. Maximum Protection Area per Sprinkler: According to UL listing and NFPA 13.
- D. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

2.02 STEEL PIPE AND FITTINGS

- A. Standard-Weight, Galvanized and Black-Steel Pipe: ASTM A 53/A 53M. Pipe ends may be factory or field formed to match joining method.
- B. Schedule 10, Black-Steel Pipe: ASTM A 135/A 135M or ASTM A 795/A 795M, Schedule 10 in NPS 2-1/2" TO NPS 5".
- C. Galvanized- and Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- D. Galvanized-and Uncoated-Steel Couplings: ASTM A 865/A 865M, threaded.
- E. Galvanized and Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- F. Malleable- or Ductile-Iron Unions: UL 860.
- G. Cast-Iron Flanges: ASME 16.1, Class 125.
- H. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

1. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick ASME B16.21, nonmetallic and asbestos free or EPDM rubber gasket.
 - a. Class 125 and Class 250, Cast-Iron, Flat-Face Flanges: Full-face gaskets.
 - b. Class 150 and Class 300, Ductile-Iron or -Steel, Raised-Face Flanges: Ring-type gaskets.
 2. Metal, Pipe-Flange Bolts and Nuts: Carbon steel unless otherwise indicated.
- I. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.
1. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- J. Grooved-Joint, Steel-Pipe Appurtenances:
1. Pressure Rating: 175-psig minimum.
 2. Galvanized, Painted, Uncoated Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting, with dimensions matching steel pipe.
 3. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213 rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.03 SPRINKLER PIPING SPECIALTIES

- A. Branch Outlet Fittings:
1. Standard: UL 213.
 2. Pressure Rating: 175-psig minimum.
 3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
 4. Type: Mechanical-tee and -cross fittings.
 5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
 6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
 7. Branch Outlets: Grooved, plain-end pipe, or threaded.
- B. Flow Detection and Test Assemblies:
1. Potter, Notifier or approved equal.
 2. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
 3. Pressure Rating: 175-psig minimum.
 4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
 5. Size: Same as connected piping.
 6. Inlet and Outlet: Threaded or grooved.
- C. Branch Line Testers:
1. Standard: UL 199.
 2. Pressure Rating: 175 psig.
 3. Body Material: Brass.
 4. Size: Same as connected piping.

5. Inlet: Threaded.
6. Drain Outlet: Threaded and capped.
7. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:

1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
2. Pressure Rating: 175-psig minimum.
3. Body Material: Cast- or ductile-iron housing with sight glass.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded.

E. Adjustable Drop Nipples:

1. Standard: UL 1474.
2. Pressure Rating: 250-psig minimum.
3. Body Material: Steel pipe with EPDM-rubber O-ring seals.
4. Size: Same as connected piping.
5. Length: Adjustable.
6. Inlet and Outlet: Threaded.

F. Flexible Sprinkler Hose Fittings:

1. Standard: UL 1474.
2. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
3. Pressure Rating: 175-psig minimum.
4. Size: Same as connected piping, for sprinkler.

2.04 SPRINKLERS

- A. Viking, Reliable, or approved equal.
- B. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
- C. Pressure Rating for Automatic Sprinklers: 175-psig minimum.
- D. Sprinkler Finishes: Chrome plated and painted.
- E. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
1. Ceiling Mounting: Chrome-plated steel, one piece, flat, Chrome-plated steel, two piece, with 1-inch vertical adjustment, white finish, one piece, flat.
 2. Sidewall Mounting: Chrome-plated steel or white finish, one piece, flat.
- F. Sprinkler Guards:
1. Standard: UL 199.
 2. Type: Wire cage with fastening device for attaching to sprinkler.

PART 3 - EXECUTION**3.01 PREPARATION**

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
- B. Report test results promptly and in writing.

3.02 WATER-SUPPLY CONNECTIONS

- A. Connect sprinkler piping to building's interior water-distribution piping.

3.03 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
 - 2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
- B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.
- C. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.
- D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- E. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- F. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13. In seismic-rated areas, refer to State Building Code.
- G. Fill sprinkler system piping with water.
- H. Install sleeves for piping penetrations of walls, ceilings, and floors.
- I. Install sleeve seals for piping penetrations of concrete walls and slabs.
- J. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.04 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- D. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- E. 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.
- F. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
 - 1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.
- G. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

3.05 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.
- B. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.

3.06 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for Electrical Systems."

3.07 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Coordinate with fire-alarm tests. Operate as required.

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

6. Verify that equipment hose threads are same as local fire department equipment.
- B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.08 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.09 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:
 1. Rooms without Ceilings: Upright sprinklers with sprinkler guards.
 2. Rooms with Suspended Ceilings: Recessed sprinklers.
 3. Wall Mounting: Sidewall sprinklers.
 4. Spaces Subject to Freezing: Pendent, dry sprinklers.
- B. Provide sprinkler types in subparagraphs below with finishes indicated.
 1. Upright, Pendent and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view.

END OF SECTION 21 13 13

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Mechanical sleeve seals.
 - 3. Sleeves.
 - 4. Escutcheons.
 - 5. Supports and anchorages.

1.03 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
 - 1. ABS: Acrylonitrile-butadiene-styrene plastic.
 - 2. CPVC: Chlorinated polyvinyl chloride plastic.
 - 3. PE: Polyethylene plastic.
 - 4. PVC: Polyvinyl chloride plastic.
- G. The following are industry abbreviations for rubber materials:
 - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 2. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS

- A. Product Data: For the following:
 - 1. Dielectric fittings.

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

2. Mechanical sleeve seals.
3. Escutcheons.

B. Welding certificates.

1.05 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

1.07 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

2.02 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

2.03 JOINING MATERIALS

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- C. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

2.04 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - 1. Available Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 3. Pressure Plates: Stainless steel. Include two for each sealing element.
 - 4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.05 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - 1. Underdeck Clamp: Clamping ring with set screws.

2.06 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
 - 1. Finish: Polished chrome-plated.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
 - 1. Finish: Polished chrome-plated.
- E. One-Piece, Stamped-Steel Type: With set screw and chrome-plated finish.
- F. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw, and chrome-plated finish.
- G. One-Piece, Floor-Plate Type: Cast-iron floor plate.
- H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

PART 3 - EXECUTION**3.01 PIPING SYSTEMS - COMMON REQUIREMENTS**

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
- B. 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.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. 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.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - 1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type, polished chrome-plated finish with spring clips.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish and set screw.
 - f. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish and set screw.
 - g. Bare Piping in Equipment Rooms: One-piece, cast-brass type with set screw.
 - h. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
 - 2. Existing Piping: Use the following:
 - a. Chrome-Plated Piping: Split-casting, cast-brass type with chrome-plated finish.
 - b. Insulated Piping: Split-plate, stamped-steel type with concealed hinge and spring clips.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
 - d. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
 - e. Bare Piping in Unfinished Service Spaces: Split-casting, cast-brass type with rough-brass finish.
 - f. Bare Piping in Unfinished Service Spaces: Split-plate, stamped-steel type with concealed hinge and set screw.
 - g. Bare Piping in Equipment Rooms: Split-casting, cast-brass type.
 - h. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.
- M. Sleeves are not required for core-drilled holes in walls only but are required in floors.
- N. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- O. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.
 4. Seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- Q. Verify final equipment locations for roughing-in.
- R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.02 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

3.03 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.04 PAINTING

- A. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

END OF SECTION 22 05 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Brass ball valves.
 - 2. Bronze ball valves.
- B. Related Sections:
 - 1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
 - 2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

1.03 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. RS: Rising stem.
- G. SWP: Steam working pressure.

1.04 SUBMITTALS

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

1.05 QUALITY ASSURANCE

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 - 1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - 2. ASME B31.1 for power piping valves.
 - 3. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, and weld ends.
 - 3. Set ball valves open to minimize exposure of functional surfaces.
 - 4. Block check valves in either closed or open position.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
 - 1. Handlever: For quarter-turn valves NPS 6 and smaller except plug valves.
- E. 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.
- F. Valve-End Connections:
 - 1. Solder Joint: With sockets according to ASME B16.18.
- G. Valve Bypass and Drain Connections: MSS SP-45.

2.02 BRASS BALL VALVES

- A. Two-Piece, Full-Port, Brass Ball Valves with Stainless-Steel Trim:
 - 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. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Crane Co.; Crane Valve Group; Jenkins Valves.

- c. Hammond Valve.
- d. Milwaukee Valve Company.

2. Description:

- a. Standard: MSS SP-110.
- b. SWP Rating: 150 psig.
- c. CWP Rating: 600 psig.
- d. Body Design: Two piece.
- e. Body Material: Forged brass.
- f. Ends: Threaded.
- g. Seats: PTFE or TFE.
- h. Stem: Stainless steel.
- i. Ball: Stainless steel, vented.
- j. Port: Full.

B. Three-Piece, Full-Port, Brass Ball Valves with Stainless-Steel Trim:

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. Jomar International, LTD.
- b. Kitz Corporation.
- c. Marwin Valve; a division of Richards Industries.
- d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

- a. Standard: MSS SP-110.
- b. SWP Rating: 150 psig.
- c. CWP Rating: 600 psig.
- d. Body Design: Three piece.
- e. Body Material: Forged brass.
- f. Ends: Threaded.
- g. Seats: PTFE or TFE.
- h. Stem: Stainless steel.
- i. Ball: Stainless steel, vented.
- j. Port: Full.

2.03 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:

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. Conbraco Industries, Inc.; Apollo Valves.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Hammond Valve.
- d. Milwaukee Valve Company.
- e. NIBCO INC.
- f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

- 2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig (1035 kPa).
 - c. CWP Rating: 600 psig (4140 kPa).
 - d. Body Design: Two piece.
 - e. Body Material: Bronze.
 - f. Ends: Threaded.
 - g. Seats: PTFE or TFE.
 - h. Stem: Stainless steel.
 - i. Ball: Stainless steel, vented.
 - j. Port: Full.

B. Three-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:

- 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. Conbraco Industries, Inc.; Apollo Valves.
 - b. Hammond Valve.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
- 2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig.
 - c. CWP Rating: 600 psig.
 - d. Body Design: Three piece.
 - e. Body Material: Bronze.
 - f. Ends: Threaded.
 - g. Seats: PTFE or TFE.
 - h. Stem: Stainless steel.
 - i. Ball: Stainless steel, vented.
 - j. Port: Full.

PART 3 - EXECUTION

3.01 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. Do not attempt to repair defective valves; replace with new valves.

3.02 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. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.

3.03 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.

3.04 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 - 1. Shutoff Service: Ball valves.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
- C. Select valves with the following end connections:
 - 1. For Copper Tubing, NPS 2 and Smaller: solder-joint valve-end option is indicated in valve schedules below.

3.05 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 3 and Smaller:
 - 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
 - 2. Ball Valves: Two piece, full port, bronze with stainless-steel trim.

END OF SECTION 22 05 23

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following hangers and supports for plumbing system piping and equipment:
 - 1. Steel pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Metal framing systems.
 - 4. Thermal-hanger shield inserts.
 - 5. Fastener systems.

1.03 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.04 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.05 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel pipe hangers and supports.
 - 2. Thermal-hanger shield inserts.
 - 3. Powder-actuated fastener systems.
- B. Shop Drawings Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze pipe hangers. Include Product Data for components.
 - 2. Metal framing systems. Include Product Data for components.
- C. Welding certificates.

1.06 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel." AWS D1.4, "Structural Welding Code--Reinforcing Steel." and ASME Boiler and Pressure Vessel Code: Section IX.
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.2, "Structural Welding Code--Aluminum."
 - 3. AWS D1.4, "Structural Welding Code--Reinforcing Steel."
 - 4. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

2.02 STEEL PIPE HANGERS AND SUPPORTS

- A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.
- B. Available Manufacturers:
 - 1. B-Line Systems, Inc.; a division of Cooper Industries.
 - 2. Empire Industries, Inc.
 - 3. ERICO/Michigan Hanger Co.
 - 4. Globe Pipe Hanger Products, Inc.
 - 5. Anvil Corp.
 - 6. GS Metals Corp.
 - 7. National Pipe Hanger Corporation.
 - 8. PHD Manufacturing, Inc.
 - 9. PHS Industries, Inc.
 - 10. Piping Technology & Products, Inc.
- C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.
- E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.03 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts

2.04 METAL FRAMING SYSTEMS

- A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.
- B. Available Manufacturers:
 - 1. B-Line Systems, Inc.; a division of Cooper Industries.
 - 2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
 - 3. GS Metals Corp.
 - 4. Power-Strut Div.; Tyco International, Ltd.
 - 5. Unistrut Corp.; Tyco International, Ltd.
- C. Coatings: Manufacturer's standard finish unless bare metal surfaces are indicated.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.05 THERMAL-HANGER SHIELD INSERTS

- A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.
- B. Available Manufacturers:
 - 1. Carpenter & Paterson, Inc.
 - 2. ERICO/Michigan Hanger Co.
 - 3. PHS Industries, Inc.
 - 4. Pipe Shields, Inc.
 - 5. Rilco Manufacturing Company, Inc.
- C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.
- D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.
- E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.06 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. Available Manufacturers:

- a. Hilti, Inc.
- b. ITW Ramset/Red Head.
- c. Masterset Fastening Systems, Inc.
- d. MKT Fastening, LLC.
- e. Powers Fasteners.

- B. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Available Manufacturers:

- a. B-Line Systems, Inc.; a division of Cooper Industries.
- b. Empire Industries, Inc.
- c. Hilti, Inc.
- d. ITW Ramset/Red Head.
- e. MKT Fastening, LLC.
- f. Powers Fasteners.

2.07 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, 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

3.01 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use padded hangers for piping that is subject to scratching.
- F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 to NPS 16, requiring up to 4 inches (100 mm) of insulation.
 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.
 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.
 5. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8.
 7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
 10. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8.
 11. Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 3.
 12. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
 13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 14. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
 15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
 16. Adjustable, Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.
 17. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30, from 2 rods if longitudinal movement caused by expansion and contraction might occur.
 18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, NPS 2-1/2 to NPS 20, from single rod if horizontal movement caused by expansion and contraction might occur.
 19. Complete Pipe Rolls (MSS Type 44): For support of pipes, NPS 2 to NPS 42, if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
 20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes, NPS 2 to NPS 24, if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
 21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes, NPS 2 to NPS 30, if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.

2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.
- H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 6. C-Clamps (MSS Type 23): For structural shapes.
 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 11. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 12. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb
 - d. de-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 13. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 14. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
 4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
 6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.
 7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
 8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
 - a. Horizontal (MSS Type 54): Mounted horizontally.
 - b. Vertical (MSS Type 55): Mounted vertically.
 - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
- M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.
- N. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.
- O. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

3.02 HANGER AND SUPPORT INSTALLATION

- A. Steel 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 building structure.

- B. 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 above for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
- D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. 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.
- F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- I. Install lateral bracing with pipe hangers and supports to prevent swaying.
- J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- K. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.
- M. Insulated Piping: Comply with the following:
 - 1. Attach clamps and spacers to piping.

- a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits according to ASME B31.9 for building services piping.
2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
5. Pipes NPS 8 and Larger: Include wood inserts.
6. Insert Material: Length at least as long as protective shield.
7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.03 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 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 contours of welded surfaces match adjacent contours.

3.04 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.

3.05 PAINTING

- A. Touch Up: 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 minimum dry film thickness of 2.0 mils.
- B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 22 05 29

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Pipe labels.
 - 2. Valve tags.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Valve numbering scheme.
- D. Valve Schedules: For each piping system to include in maintenance manuals.

1.04 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.01 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. 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: At least 1-1/2 inches high.

2.02 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass S-hook.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION**3.01 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.

3.02 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 20 feet along each run. Reduce intervals to 10 feet in areas of congested piping and equipment.
- B. Pipe Label Color Schedule:
 - 1. Domestic Water Piping:
 - a. Background Color: White.
 - b. Letter Color: Black.
 - 2. Sanitary Waste Piping:
 - a. Background Color: White.
 - b. Letter Color: Black.

3.03 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; 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.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve-Tag Size and Shape:
 - a. Cold Water: 1-1/2 inches, round.
 - b. Hot Water: 1-1/2 inches, round.
 - 2. Valve-Tag Color:
 - a. Cold Water: Natural.
 - b. Hot Water: Natural.
 - 3. Letter Color:
 - a. Cold Water: Black.
 - b. Hot Water: Black.

END OF SECTION 22 05 53

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Insulation Materials:
 - a. Flexible elastomeric.
 - b. Mineral fiber.
 - 2. Adhesives.
 - 3. Mastics.
 - 4. Sealants.
 - 5. Factory-applied jackets.
 - 6. Tapes.
 - 7. Securements.
 - 8. Corner angles.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets.
- B. Shop Drawings:
 - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 - 3. Detail removable insulation at piping specialties, equipment connections, and access panels.
 - 4. Detail application at control devices.
 - 5. Detail field application for each equipment type.
- C. Qualification Data: For qualified Installer.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes,

and cement material containers, with appropriate markings of applicable testing and inspecting agency.

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.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.06 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application and equipment Installer for equipment insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.07 SCHEDULING

- A. Schedule insulation application after pressure testing systems. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.01 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- D. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Aeroflex USA Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.
- E. Mineral-Fiber, Preformed Pipe Insulation:

SECTION 220700 - PLUMBING INSULATION

1. Products: Available products that may be incorporated into the Work shall be one of the following:
 - a. Johns Manville; Micro-Lok HP.
 - b. Knauf Insulation; 1000 Pipe Insulation ASJ+.
 - c. Owens Corning; SSL II with ASJ MAX Fiberglass Pipe Insulation.
2. Type I, 850 deg F (454 deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.02 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 and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Aeroflex USA Inc.; Aero seal.
 - b. Armacell LCC; 520 Adhesive.
 - c. Foster Products Corporation, H. B. Fuller Company; 85-75.
 - d. RBX Corporation; Rubatex Contact Adhesive.
 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Products, Division of ITW; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
 - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
 - d. Marathon Industries, Inc.; 225.
 - e. Mon-Eco Industries, Inc.; 22-25.
 2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. ASJ Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Products, Division of ITW; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
 - c. ITW TACC, Division of Illinois Tool Works; S-90/80.

- d. Marathon Industries, Inc.; 225.
 - e. Mon-Eco Industries, Inc.; 22-25.
 - 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. PVC Jacket Adhesive: Compatible with PVC jacket.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Chemical Company (The); 739, Dow Silicone.
 - b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
 - c. P.I.C. Plastics, Inc.; Welding Adhesive.
 - d. Speedline Corporation; Speedline Vinyl Adhesive.
 - 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- F. ASJ Flashing Sealants:
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Products, Division of ITW; CP-76.
 - 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 3. Fire- and water-resistant, flexible, elastomeric sealant.
 - 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 5. Color: White.
 - 6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.03 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-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.04 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
 - b. Compac Corp.; 104 and 105.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
 - 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. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
 - b. Compac Corp.; 130.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
 - d. 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.

2.05 CORNER ANGLES

- A. PVC Corner Angles: 30 mil thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White to match adjacent surface.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
1. Verify that systems and equipment to be insulated have been tested and are free of defects.
 2. Verify that surfaces to be insulated are clean and dry.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
1. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at bottom of horizontal runs.
- E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. 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.
- J. 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.
 - 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.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.

- 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere and seal patches similar to butt joints.
- N. For above ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.
 - 4. Manholes.
 - 5. Handholes.
 - 6. Cleanouts.

3.04 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- C. 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 Division 07 Section "Penetration Firestopping" firestopping and fire-resistive joint sealers.

D. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.05 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. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges 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.
7. For services not specified to receive a field-applied jacket except for flexible elastomeric, 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.
8. Label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to

and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.06 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
 - 1. Install pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 - 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Pipe Fittings and Elbows:
 - 1. Install mitered sections of pipe insulation.
 - 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- D. Insulation Installation on Valves and Pipe Specialties:
 - 1. Install preformed valve covers manufactured of same material as pipe insulation when available.
 - 2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - 3. Install insulation to flanges as specified for flange insulation application.
 - 4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.07 MINERAL-FIBER INSULATION INSTALLATION

- A. Insulation Installation on Pipe Flanges:
 - 1. Install preformed pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
 - 4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
- B. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.08 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
1. Drainage piping located in crawl spaces.
 2. Underground piping.
 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.09 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Cold Water:
1. Insulation shall be one of the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- B. Domestic Hot and Recirculated Hot Water:
1. Insulation shall be one of the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

END OF SECTION 22 07 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
 - 2. Specialty valves.
 - 3. Escutcheons.
 - 4. Sleeves and sleeve seals.

1.03 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to ASCE/SEI 7.

1.04 SUBMITTALS

- A. Product Data: For the following products:
 - 1. Specialty valves.
 - 2. Dielectric fittings.
 - 3. Escutcheons.
 - 4. Sleeves and sleeve seals.
- B. Water Samples: Specified in "Cleaning" Article.
- C. Coordination Drawings: For piping in equipment rooms and other congested areas, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 - 1. Fire-suppression piping.
 - 2. Domestic water piping.
- D. Field quality-control reports.

1.05 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 61 for potable domestic water piping and components.

1.06 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.02 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L (ASTM B 88M, Type B) water tube, drawn temper.
 - 1. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.
 - 2. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
 - 3. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
 - 4. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.03 PIPING JOINING MATERIALS

- A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- B. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.04 SPECIALTY VALVES

- A. Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.

2.05 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
- B. Dielectric Unions:
 - 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. Capitol Manufacturing Company.
 - b. Central Plastics Company.
 - c. EPCO Sales, Inc.
 - d. Hart Industries International, Inc.
 - e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - f. Zurn Plumbing Products Group; Wilkins Water Control Products.
 - 2. Description:
 - a. Pressure Rating: 150 psig at 180 deg F.

- b. End Connections: Solder-joint copper alloy and threaded ferrous.

2.06 ESCUTCHEONS

- A. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.
- B. One Piece, Cast Brass: Polished, chrome-plated finish with setscrews.
- C. One Piece, Deep Pattern: Deep-drawn, box-shaped brass with chrome-plated finish.
- D. One Piece, Stamped Steel: Chrome-plated finish with setscrew.
- E. Split Casting, Cast Brass: Polished, chrome-plated finish with concealed hinge and setscrew.
- F. Split Plate, Stamped Steel: Chrome-plated finish with concealed hinge, setscrew.
- G. One-Piece Floor Plates: Cast-iron flange.
- H. Split-Casting Floor Plates: Cast brass with concealed hinge.

2.07 SLEEVES

- A. Cast-Iron Wall Pipes: Fabricated of cast iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc-coated, with plain ends.

2.08 SLEEVE SEALS

- 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, Inc.
 - 4. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing element unit, designed for field assembly, used to fill annular space between pipe 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: Stainless steel.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

PART 3 - EXECUTION

3.01 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. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install shutoff valve immediately upstream of each dielectric fitting.
- D. Install domestic water piping level and plumb.
- E. Install seismic restraints on piping. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- F. 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.
- G. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- H. Install piping adjacent to equipment and specialties to allow service and maintenance.
- I. Install piping to permit valve servicing.
- J. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
- K. Install piping free of sags and bends.
- L. Install fittings for changes in direction and branch connections.
- M. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

3.02 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. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
- E. Soldered Joints: 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."

3.03 VALVE INSTALLATION

- A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.
- B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball valves for piping NPS 3 and smaller. Use gate valves for piping NPS 4 and larger.
- C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."
 - 1. Hose-End Drain Valves: At low points in water mains, risers, and branches.
 - 2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.

3.04 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 or nipples unions.

3.05 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.
 - 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: 60 inches with 3/8-inch rod.
 - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.

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3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2: 108 inches with 1/2-inch rod.
5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
6. NPS 6: 10 feet with 5/8-inch rod.
7. NPS 8: 10 feet with 3/4-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.

3.06 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. 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 required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.

3.07 ESCUTCHEON INSTALLATION

- A. Install escutcheons for penetrations of walls, ceilings, and floors.
- B. Escutcheons for New Piping:
 1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
 2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.
 3. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.
 4. Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish cast brass with rough-brass finish.
 5. Bare Piping in Equipment Rooms: One piece, cast brass.
 6. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.
- C. Escutcheons for Existing Piping:
 1. Chrome-Plated Piping: Split casting, cast brass with chrome-plated finish.
 2. Insulated Piping: Split plate, stamped steel with concealed hinge and spring clips.
 3. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish.
 4. Bare Piping at Ceiling Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish.
 5. Bare Piping in Unfinished Service Spaces: Split casting, cast brass with polished chrome-plated finish.
 6. Bare Piping in Equipment Rooms: Split casting, cast brass.
 7. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting floor plate.

3.08 SLEEVE INSTALLATION

- A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
- B. Sleeves are not required for core-drilled holes.
- C. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.
- D. Install sleeves in new partitions, slabs, and walls as they are built.
- E. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.
- F. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.
- G. Install sleeve materials according to the following applications:
 - 1. Sleeves for Piping Passing through Concrete Floor Slabs: Steel pipe.
 - 2. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Steel pipe.
 - a. Extend sleeves 2 inches above finished floor level.
 - b. For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - 3. Sleeves for Piping Passing through Gypsum-Board Partitions:
 - a. Steel pipe sleeves for pipes smaller than NPS 6.
 - b. Galvanized-steel sheet sleeves for pipes NPS 6 and larger.
 - c. Exception: Sleeves are not required for water supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
 - 4. Sleeves for Piping Passing through Concrete Roof Slabs: Steel pipe.
 - 5. Sleeves for Piping Passing through Exterior Concrete Walls:
 - a. Steel pipe sleeves for pipes smaller than NPS 6.
 - b. Cast-iron wall pipe sleeves for pipes NPS 6 and larger.
 - c. Install sleeves that are large enough to provide 1-inch annular clear space between sleeve and pipe or pipe insulation when sleeve seals are used.
 - 6. Sleeves for Piping Passing through Interior Concrete Walls:
 - a. Steel pipe sleeves for pipes smaller than NPS 6.
 - b. Galvanized-steel sheet sleeves for pipes NPS 6 and larger.
- H. 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 in Division 07 Section "Penetration Firestopping" for firestop materials and installations.

3.09 SLEEVE SEAL INSTALLATION

- A. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.
- B. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.10 IDENTIFICATION

- A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.
- B. Label pressure piping with system operating pressure.

3.11 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Piping Inspections:
 - 1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - 2. 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:
 - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 - 3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
 - 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- C. Piping Tests:
 - 1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 - 2. 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.
 - 3. 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.

4. 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 to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 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 for corrective action required.
- D. Domestic water piping will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.12 ADJUSTING

- A. Perform the following adjustments before operation:
1. Close drain valves 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. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.13 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. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.14 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Fitting Option: Brazed joints may be used on aboveground copper tubing.
- D. Aboveground domestic water piping, shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B) wrought- copper solder-joint fittings; and soldered joints.

3.15 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use ball for all piping sizes.
 - 2. Drain Duty: Hose-end drain valves.

END OF SECTION 22 11 16

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following for soil, waste, and vent piping inside the building:
 - 1. Pipe, tube, and fittings.

1.03 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber.
- C. LLDPE: Linear, low-density polyethylene plastic.
- D. NBR: Acrylonitrile-butadiene rubber.
- E. PE: Polyethylene plastic.
- F. PVC: Polyvinyl chloride plastic.
- G. TPE: Thermoplastic elastomer.

1.04 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.
- B. Seismic Performance: Soil, waste, and vent piping and support and installation shall be capable of withstanding the effects of seismic events determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures."

1.05 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. Shop Drawings:
 - 1. Design Calculations: Signed and sealed by a qualified professional engineer for selecting seismic restraints.
 - 2. Sovent Drainage System: Include plans, elevations, sections, and details.
- C. Field quality-control inspection and test reports.

1.06 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; "NSF-drain" for plastic drain piping; "NSF-tubular" for plastic continuous waste piping; and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS**2.01 MANUFACTURERS**

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

2.02 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.03 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service class.
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.04 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. Solvent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.
- C. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.
 - 1. Heavy-Duty, Shielded, Stainless-Steel Couplings: With stainless-steel shield, stainless-steel bands and tightening devices, and ASTM C 564, rubber sleeve.
 - a. Manufacturers:
 - 1) Clamp-All Corp.
 - 2) Ideal Div.; Stant Corp.
 - 3) Mission Rubber Co.
 - 4) Tyler Pipe; Soil Pipe Div.

2.05 COPPER TUBE AND FITTINGS

- A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.
 - 1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.
- B. Hard Copper Tube: ASTM B 88, Types L and M (ASTM B 88M, Types B and C), water tube, drawn temper.
 - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.
 - 3. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.06 PVC PIPE AND FITTINGS

- A. Solid-Wall PVC Pipe: ASTM D 2665, Schedule 40, drain, waste, and vent.
- B. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
- C. Adhesive Primer: ASTM F 656
 - 1. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Solvent Cement: ASTM D 2564
 - 1. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION**3.01 PIPING APPLICATIONS**

- A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.
- B. Aboveground, soil and waste piping shall be any of the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 - 2. Hubless cast-iron soil pipe and fittings heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
 - 3. Copper DWV tube, copper drainage fittings, and soldered joints.
 - 4. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints, as allowed by the state plumbing code.
- C. Aboveground, vent piping shall be any of the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.

2. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
 3. Copper DWV tube, copper drainage fittings, and soldered joints.
 4. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints, as allowed by the state plumbing code.
- D. Underground, soil, waste and vent piping shall be any of the following:
1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 2. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
 3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints, as allowed by the state plumbing code.

3.02 PIPING INSTALLATION

- A. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- B. 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."
- C. 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 2 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.
- D. 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.
- E. Install soil and waste drainage and vent piping at the State Plumbing Codes minimum slopes.
- F. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- G. Install PVC soil and waste drainage and vent piping according to ASTM D 2665 and state plumbing code.
- H. Install underground PVC soil and waste drainage piping according to ASTM D 2321 and state plumbing code.
- I. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.03 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- B. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- C. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
- D. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- E. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.04 HANGER AND SUPPORT INSTALLATION

- A. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- B. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Install individual, straight, horizontal piping runs according to the following:
 - 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.
- C. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 - 2. NPS 3: 60 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 - 4. NPS 6: 60 inches with 3/4-inch rod.
 - 5. NPS 8 to NPS 12: 60 inches with 7/8-inch rod.
- G. Install supports for vertical cast-iron soil piping every 15 feet.

- H. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
 - 2. NPS 3: 48 inches with 1/2-inch rod.
 - 3. NPS 4 and 5: 48 inches with 5/8-inch rod.
 - 4. NPS 6: 48 inches with 3/4-inch rod.
 - 5. NPS 8 to NPS 12: 48 inches with 7/8-inch rod.
- I. Install supports for vertical PVC piping every 48 inches.
- J. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.05 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect 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.

3.06 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 25-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.

3.07 CLEANING

- 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.

END OF SECTION 22 13 16

PART 1 - GENERAL**1.01 RELATED DOCUMENTS**

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

1.02 SUMMARY

- A. This Section includes the following conventional plumbing fixtures and related components:
 - 1. Faucets for lavatories and sinks.
 - 2. Protective shielding guards.
 - 3. Fixture supports.
 - 4. Commercial sinks.
- B. Related Sections include the following:
 - 1. Division 22 Section "Domestic Water Piping Specialties" for backflow preventers, floor drains, and specialty fixtures not included in this Section.

1.03 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- C. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.
- D. Cultured Marble: Cast-filled-polymer-plastic material with surface coating.
- E. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.
- F. FRP: Fiberglass-reinforced plastic.
- G. PMMA: Polymethyl methacrylate (acrylic) plastic.
- H. PVC: Polyvinyl chloride plastic.
- I. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.04 SUBMITTALS

- A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

SECTION 224000 - PLUMBING FIXTURES

- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.
- D. Warranty: Special warranty specified in this Section.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.
 - 1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.
- D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- G. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
 - 1. Solid-Surface-Material Lavatories and Sinks: ANSI/ICPA SS-1.
 - 2. Stainless-Steel Commercial, Handwash Sinks: NSF 2 construction.
 - 3. Vitreous-China Fixtures: ASME A112.19.2M.
 - 4. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
- H. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:
 - 1. Faucets: ASME A112.18.1.
 - 2. Hose-Coupling Threads: ASME B1.20.7.
 - 3. NSF Potable-Water Materials: NSF 61.
 - 4. Supply Fittings: ASME A112.18.1.
 - 5. Brass Waste Fittings: ASME A112.18.2.
- I. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:

SECTION 224000 - PLUMBING FIXTURES

1. Atmospheric Vacuum Breakers: ASSE 1001.
2. Brass and Copper Supplies: ASME A112.18.1.
3. Brass Waste Fittings: ASME A112.18.2.
4. Battery-Operation Flushometers: ASSE 1037 and UL 1951.

1.06 WARRANTY

- A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace components of plumbing fixtures that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures of unit shell.
 - b. Faulty operation of controls, blowers, pumps, heaters, and timers.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 2. Warranty Period for Commercial Applications: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

- 2.01 Plumbing fixture trim shall be American Standard, T&S Brass, Zurn or approved equal.
- 2.02 Stainless steel sinks shall be Elkay, Just, or approved equal.
- 2.03 Plumbing Fixtures
- 2.04 Refer to Drawing P0.1 for Manufacturer, Model Number and Description.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.
- B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install counter-mounting fixtures in and attached to casework.
- C. Install fixtures level and plumb according to roughing-in drawings.

- D. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 - 1. Exception: Use ball or globe valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
- E. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- F. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
- G. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- H. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.
- I. 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.
- J. Install traps on fixture outlets.
 - 1. Exception: Omit trap on fixtures with integral traps.
 - 2. Exception: Omit trap on indirect wastes, unless otherwise indicated.
- K. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Common Work Results for Plumbing."
- L. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."

3.03 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.04 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.05 ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.
- C. Replace washers and seals of leaking and dripping faucets and stops.

3.06 CLEANING

- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
 - 1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
 - 2. Remove sediment and debris from drains.
- B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.07 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 40 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. All work and material on this project shall be in compliance with all local, state and federal regulations including but not limited to the following:
 - 1. Established Federal Standards of the Occupational Safety and Health Administration under the Department of Labor.
 - 2. New Jersey modifications with the International Building Code.
 - 3. International Mechanical Code.
 - 4. International Energy Conservation Code.
 - 5. International Plumbing Code with modification by New Jersey Plumbing Code.
- C. The above regulations are considered a part of the specifications and shall prevail should they differ with the plans and specifications. Prior to construction the Contractor shall notify the Architect of the difference. Should the Contractor not so notify the Architect, the Contractor shall fully comply without claim for extra costs

1.2 SUMMARY

- A. This section includes General Provisions for HVAC/Mechanical work.
- B. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Transition fittings.
 - 3. Dielectric fittings.
 - 4. Mechanical sleeve seals.
 - 5. Sleeves.
 - 6. Escutcheons.
 - 7. Grout.
 - 8. HVAC demolition.
 - 9. Equipment installation requirements common to equipment sections.
 - 10. Painting and finishing.
 - 11. Concrete bases.
 - 12. Supports and anchorages.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

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- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
 - 1. CPVC: Chlorinated polyvinyl chloride plastic.
 - 2. PE: Polyethylene plastic.
 - 3. PVC: Polyvinyl chloride plastic.
- G. The following are industry abbreviations for rubber materials:
 - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. SHOP DRAWINGS AND OTHER RELATED SUBMITTALS

- 1. The type submittal information required for each item of equipment shall be as indicated in the individual sections of the specification including coordination drawings.
- 2. When a substitute item of equipment has been submitted for approval, submit layout drawings indicating the changes necessary to adapt the substituted item of equipment to the system design.
- 3. Submittal data shall include Specification data, such as metal gauges, finishes, optional accessories, etc., even though such equipment and materials may be detailed on the drawings or specified. In addition, the submittal data shall include performance (certification) data, wiring diagrams where applicable, accurate dimensional data and a recommended spare parts list. Outline or dimensional drawings alone are not acceptable. No roughing-in, connections, etc., shall be done until Architect reviewed equipment submittals are in the hands of the Contractors. It shall be the Contractor's responsibility to obtain drawings and to make all connections, etc., in the neatest and most workmanlike manner possible.
- 4. In general, normal catalog information (with the particular items underlined or otherwise denoted as being the submitted item) will be acceptable as submittal data. Installation, operating and maintenance instructions must be that information, specifically applicable to the items furnished, ordinarily supplied with the equipment to the Owner with any modifications indicated. Wiring diagrams must be correct for the application. Generalized wiring diagrams, showing alternate methods of connection, will not be acceptable unless all unrelated sections are marked out. Submittal data sheets, which indicate several different model numbers, figure numbers, optional accessories, installation arrangements, etc., shall be clearly marked to indicate the specific items of equipment to be furnished. Samples and certificates shall be furnished as requested. Submittal data must be complete for each piece of equipment; piecemeal data will not be processed.
- 5. It shall be noted that the reviewing of shop drawings by the Architect applies only to general design, arrangement, type, capacity, and quality. Such review does not apply to quantities, dimensions, connection locations and the like. In all cases, the Contractor alone shall be responsible for furnishing the proper quantity of equipment and/or materials required, that all equipment fits the available space in

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a satisfactory manner, all equipment characteristics are appropriate and that all connections are suitably located.

6. Before the project is accepted, all submittal data (shop drawings, etc.) must be complete and reviewed.
7. After equipment requiring temperature control connection has been reviewed by the Architect, furnish complete manufacturer's data and wiring diagrams to the Automatic Temperature Control Supplier.

B. Product Data: For the following:

1. Transition fittings.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Escutcheons.

C. Welding certificates.

D. OPERATION MANUAL

1. Furnish owner with three (3) bound sets of operation manuals at completion of project. Each set is to be bound separately in a loose leaf binder. Manuals shall include Contractor's Name and telephone numbers that can be called for service calls. Also, include the following in the manuals for transmittal to the Owner:

All project stamped acceptable shop drawings and copies of all certificates.

Lubrication schedules and procedures

Spare parts list; indicate all items that should be maintained at the site by owner.

Maintenance and trouble-shooting suggestions for equipment.

Non-Lien Affidavits

Wiring Diagrams

Certification of owner instruction of system and equipment

Record drawings

2. The operating instructions shall integrate each piece of equipment in any one system into a numbered step-by-step sequence of operation, including valves, controls, etc.
3. The parts list shall consist of a complete list of replacement items with all component parts numbered for each piece of mechanical or electrical equipment and shall include directions for ordering said replacement items.
4. Maintenance procedure shall outline required routine maintenance for all equipment and systems and instructions for repair of the equipment.

E. SUBSTITUTION OF MATERIALS AND EQUIPMENT

1. When the Contractor requests approval of substitute materials and/or equipment, except when under formal alternate proposal, it shall be understood and agreed that such substitution, if approved, will be made without cost to the Owner, regardless of changes in connections, spacing, electrical service, etc. In all cases where substitutions affect other trades the Contractor offering such substitutions shall reimburse all affected Contractors for all necessary changes in their work (without cost to Owner).

F. RECORD DRAWINGS

1. This Contractor shall submit to the Owner one (1) reproducible copy, one (1) print and a set of files in ACAD (LATEST VERSION) of Record Drawings. Drawings

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shall be identified with the Contractor's name, the date, and title "RECORD DRAWINGS" on the paper copies.

2. These drawings shall show the size, location and routing of all ductwork, wiring, piping and equipment relative to this Division.
3. These drawings shall be prepared by a CAD operator in a professional manner, to scale, and dimensioned.

1.5 QUALITY ASSURANCE

- A. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.
- B. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- C. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- D. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

- A. Coordination Between Trades:
 1. Carefully examine all architectural, structural, electrical and any other drawings and specifications pertaining to the construction before fabricating and installing the work described and indicated under these drawings and specifications. Cooperate with all other Contractors in locating piping, ductwork, sleeves, equipment, etc., in order to avoid conflict with all other Contractor's work. Prepare and submit detailed coordination drawings. No extra compensation will be allowed to cover the cost of relocating piping, ducts, etc., or equipment found encroaching on space required by others.

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2. Lay out work from construction lines and levels established by the General Contractor. This Contractor shall be responsible for the proper location and placement of his work.
 3. Any discrepancies occurring on the accompanying drawings and between the drawings and the specifications shall be reported to the Architect prior to any fabrication and installation so that a workable solution can be presented. Extra payment will not be allowed for the relocation of, or revision to, piping, ductwork, equipment, etc.
- B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.
- C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- D. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

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2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- H. Solvent Cements for Joining Plastic Piping:
 1. CPVC Piping: ASTM F 493.
 2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.4 TRANSITION FITTINGS

- A. Plastic-to-Metal Transition Fittings: CPVC and PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
 1. Available Manufacturers - Eslon Thermoplastics.
- B. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
 1. Available Manufacturers - Thompson Plastics, Inc.
- C. Plastic-to-Metal Transition Unions: MSS SP-107, CPVC and PVC four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.
 1. Available Manufacturers - NIBCO, Inc.; Chemtrol Div.

2.5 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).
 1. Available Manufacturers:

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- a. Watts Industries, Inc.; Water Products Div.
 - b. Zurn Industries, Inc.; Wilkins Div.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.
 - 1. Available Manufacturers:
 - a. Epco Sales, Inc.
 - b. Watts Industries, Inc.; Water Products Div.
- E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - 1. Available Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Central Plastics Company.
 - c. Pipeline Seal and Insulator, Inc.
 - 2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig (1035- or 2070-kPa) minimum working pressure where required to suit system pressures.
- F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).
 - 1. Available Manufacturers:
 - a. Calpico, Inc.
 - b. Lochinvar Corp.
- G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).
 - 1. Available Manufacturers:
 - a. Precision Plumbing Products, Inc.
 - b. Sioux Chief Manufacturing Co., Inc.
 - c. Victaulic Co. of America.

2.6 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - 1. Available Manufacturers:
 - a. Calpico, Inc.
 - b. Metraflex Co.
 - c. Pipeline Seal and Insulator, Inc.

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2. Sealing Elements: EPDM and/or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Stainless steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.7 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 1. Underdeck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D 1785, Schedule 40.

2.8 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
 1. Finish: Polished chrome-plated.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
 1. Finish: Polished chrome-plated.
- E. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.
- F. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw or spring clips, and chrome-plated finish.
- G. One-Piece, Floor-Plate Type: Cast-iron floor plate.
- H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.9 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION**3.1 STRUCTURAL RESPONSIBILITY**

- A. Properly shore, brace, support, etc., any construction to guard against cracking, settling, collapsing, displacing or weakening. No structural member shall be cut without the written consent of the Architect.
- B. Any damage occurring to the structure, due to failure to exercise proper precautions or due to action of the elements, shall be promptly and properly made good to the satisfaction of the Owner or Architect, without cost.

3.2 PROTECTION OF THE BUILDING AND STORED EQUIPMENT

- A. Do not store materials or equipment on any floor or roof of building in such quantity that these parts of the building will be overloaded in any way. Do not move heavy equipment across any floor or roof without first submitting the details of the work to the Architect and having obtained his approval. In cases where frequent movement of men or materials over the roof is encountered, provide walking boards or other suitable protection for the roofing.
- B. Provide suitable storage for, and completely protect all materials and equipment prior to installation. Storage shall be dry, clean and safe. Any materials or equipment lost through theft or mishandling shall be replaced, all without additional cost to the Owner

3.3 DRAWINGS

- A. The drawings accompanying these specifications are diagrammatic and indicate the general design and arrangement of the proposed work. Do not scale drawings for the exact location of equipment and work. The exact routing and/or location of piping, ductwork, sleeves, equipment, etc., unless specifically dimensioned on the drawings, shall be determined to suit field conditions encountered, and to avoid interferences with other Contractors' work. Coordination drawings will be required.
- B. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Duct installation, indicating coordination with general construction, building components, Plumbing piping, HVAC piping, and other building services. Indicate proposed changes to duct layout.
 - 2. Suspended ceiling components.
 - 3. Structural members to which duct will be attached.

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4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.

3.4 EQUIPMENT CONNECTIONS

- A. Make all water and drainage connections, etc., to equipment furnished by others under this Contract whenever such equipment is shown on any of the drawings or mentioned in any section of the specifications, unless otherwise specifically specified hereinafter.

3.5 TOOLS

- A. Furnish and install all special wrenches, valve handles, keys, or other special tools as necessary to dismantle or service any piece of equipment installed. This shall include thermostat keys in the number directed by the Architect.

3.6 PERMITS AND APPROVALS

- A. All permits and certificates of approval for the complete system shall be obtained by the respective Contractors from the authorities governing such work. The cost of all permits, tap-in-fees and approvals shall be borne by the Contractor furnishing the work, except as noted in the General Requirements. All work shall be approved by the Architect before final payment will be made.

3.7 TEMPORARY UTILITIES

- A. Temporary utilities for water, gas, electricity, and heat shall be provided as indicated under the "General Requirements" of the Specifications.
- B. Should it become necessary to operate the building HVAC equipment before final acceptance of the job, the Owner or the Contractor may be allowed to do so, but only after proper adjustment and complete system operation by the Contractor whose equipment is affected. Comply with all applicable LEED requirements for construction indoor air quality management. Refer to LEED specification sections. The controls shall be verified and commissioned for correct operation.
- C. The use of the permanent Building HVAC equipment will in no way release the Contractor of his obligations to furnish all equipment under his contract in proper and acceptable condition. Fan coil apparatus provided with filters, if used for temporary heat, shall not be operated without filters, and clean filters shall be installed before final inspection. Equipment such as boilers and convertors shall not be operated until such time as all safety firing controls, pressure relief valves, etc., are installed and functioning properly.

3.8 FILTER ELEMENTS

- A. Contractor shall furnish four (4) sets of filters: one set for during construction for construction heating purposes, one set for use during balance work, one set for installation prior to substantial completion, and one set (spare) for Owner's use at later date.

3.9 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. 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.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. 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.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - 1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type with spring clips.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece or split-casting, cast-brass type with polished chrome-plated finish.
 - g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge and set screw.
 - h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
 - i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type with concealed or exposed-rivet hinge and spring clips set screw or spring clips.

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- j. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
 - k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type with set screw or spring clips.
 - l. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- M. Sleeves are not required for core-drilled holes.
- N. Permanent sleeves are not required for holes formed by removable PE sleeves.
- O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- P. Install sleeves for pipes passing through concrete and masonry Fire-Rated walls, gypsum-board partitions, and concrete floor and roof slabs.
- 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 3. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. PVC or Steel Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).
 - b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.
 - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- Q. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- 1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
 - 2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.
 - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

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- R. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- S. Verify final equipment locations for roughing-in.
- T. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.10 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. 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 unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - 3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - 4. PVC Nonpressure Piping: Join according to ASTM D 2855.
- J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

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- K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

3.11 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
 2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.12 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.13 PAINTING

- A. Painting of HVAC systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.
- C. Exposed piping shall be painted, individual colors, by system type as follows:

EQUIPMENT AND PIPING COLOR IDENTIFICATION CODE:

Unit Process	Flow	Color	Abbreviation
	Drain (All)	Gray	Drain
	Fire Protection	Red	Fire
	HVAC (Ducts)	Gray	HVAC

3.14 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

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1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 03."

3.15 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

3.16 GROUTING

- A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

3.17 INSTALLATION

- A. All equipment shall be installed at locations indicated.
- B. Assembly and installation of equipment shall be in strict accordance with manufacturer's installation instructions.
- C. Equipment shall be securely anchored in place. Care shall be exercised to correctly orient equipment before securing in place.

3.18 EQUIPMENT PADS AND GROUTING

- A. Floor-mounted equipment, such as air handling units, boilers, water heaters, etc., shall be provided with a suitable concrete pad. Each pad shall have suitable hold-down bolts in pipe sleeves, of sufficient number to properly secure the apparatus. Hold-down bolts shall be accurately located by template prepared from actual measurement of the equipment or from certified drawings furnished by the equipment manufacturer. Hold-down bolts shall be set in wrought iron pipe sleeves $\frac{3}{4}$ " larger than the bolts to facilitate alignment of equipment.
- B. All pads shall be complete with all pipe sleeves, anchor bolts, reinforcing steel, concrete, etc., as required. Pads larger than 18" in width shall be reinforced with $\frac{1}{2}$ " bars on 9" centers, both ways. Bars shall be approximately 3" below top of pad. All parts of pads and foundations shall be properly spaced. If exposed parts of the pads and foundations are rough after removing forms, all rough surfaces shall be rubbed to a smooth surface.
- C. Pads, unless indicated otherwise, shall extend 4" above the finished floor and shall be securely anchored to the floor so vibration or stresses cannot cause lateral movement.
- D. In general, pads for small equipment such as air handling units, boilers, pumps, etc., shall extend 6" beyond base dimensions. For larger equipment, extend pads 18" beyond base of overall dimensions to allow walking and servicing space.
- E. Where grouting is required, equipment shall be set to use by jack screws or by use of wedges where no jack screws are provided. After grout has set up, the supporting jack screws or wedges shall be removed and the holes left by removal of the wedges shall be dry packed.

3.19 EQUIPMENT MOUNTING

- A. All equipment with moving parts, such as fans, air handling units, etc., shall be mounted on vibration supports and in addition, said equipment shall be isolated from external connections, such as piping, ducts, raceways, etc., by means of flexible connectors.
- B. Unitary equipment, such as small exhaust fans, etc., shall be rigidly braced and mounted to wall, floor, or ceiling, as required, and tightly gasketed and sealed to mounting surface to prevent air leakage and to obtain quiet operation
- C. Flush and surface mounted equipment such as diffusers, grilles, etc., shall be gasketed and sealed to mounting surface
- D. Final service connection to ceiling-mounted diffusers, grilles, etc., shall be made with approved flexible connectors and as indicated
- E. Where drivers are connected with couplings, the alignment shall be checked and the driver reconnected. Couplings shall have tolerances as indicated by the manufacturer.
- F. Where drivers are connected with belt or chain drives, the driver and driver shafts shall be aligned parallel. The motor adjustment shall be loosened sufficiently to put on the belts or chain and then tightened to the proper centerline distance or tension. No belt compound shall be used.

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3.20 PLATFORMS AND SUPPORTING STANDS

- A. Each piece of equipment or apparatus suspended from the ceiling or mounted above the floor level shall be supported in accordance with the best recognized practice.
- B. Such supporting or mounting means shall be provided by each Contractor for all equipment furnished by him.
- C. Exercise extreme care that structural members of building are not overloaded by such equipment.
- D. All structural members of platforms, supporting stands, etc., shall be factory prime coated.
- E. Finish painting shall be the responsibility indicated under SECTION PAINTING, DIVISION FINISHES.

3.21 METAL GUARDS

- A. Furnish and install in approved expanded metal or sheet metal guard around all exposed moving and rotating parts, such as pump couplings, belt drives, fan belts, etc.

3.22 FRAMING

- A. All rectangular or special shaped openings in walls, partitions, roofs, ceilings, etc., including plaster, stucco, or similar materials shall be framed by means of plaster frames, casing beads, wood or metal angle members, as required. The intent of this paragraph is to prohibit cutting and patching in new construction and to provide smooth, even termination of wall, floor, and ceiling finishes, as well as to provide a fastening means for grilles, diffusers, etc. Lintels shall be provided over all openings in walls, etc., when not specifically indicated elsewhere. Lintels shall be of size and shape to prevent excessive deflection and shall be approved by Architect prior to installation.

3.23 CUTTING, FITTING AND PATCHING

- A. Each respective Contractor shall do all cutting and drilling of masonry, steel, wood, or iron work, and all fitting necessary for the proper installation of all apparatus and materials.
- B. No cutting or drilling of the structure, of any kind, shall be done without first obtaining permission from Architect. All cutting and drilling shall be done under the supervision of the General Contractor in strict accordance with instructions furnished by Architect.
- C. All patching and finishing shall be the responsibility of the Contractor whose cutting or drilling makes such patching and finishing necessary. Patching and finishing shall be done by workmen skilled in the trade affected (masonry, plastering, painting, etc.).

3.24 ROOF-MOUNTED EQUIPMENT

- A. Roof-mounted equipment shall be set on the concrete, steel, or wood framed curbs approved by Architect. Curbs shall be as indicated and/or as recommended by the equipment manufacturer. All curbs shall be flashed and counterflashed watertight.

SECTION 230500 – COMMON WORK RESULTS FOR HVAC

3.25 CLEANING, TESTING AND PREPARATION FOR START-UP

- A. All equipment shall be cleaned of all foreign material.
- B. All equipment shall be lubricated and placed in proper working order. Drives on rotating equipment shall be checked for proper rotation and alignment. V-belt drives shall be checked and adjusted for proper tension. All fans shall be operated for at least 24 hours so that the initial stretch of the V-belt drives will take place before testing. When the belts have stretched, the fan drives shall be realigned and adjusted for tightness to make sure that the excess slippage is eliminated. All drives shall be set for the recommended speeds. All sheaves and bearing blocks shall be checked for any loose screws or nuts.
- C. Where equipment requires a charge of material, it shall be filled by the Contractor with material recommended by the equipment manufacturer.
- D. All controls and safety devices shall be checked to determine that they are in place and properly installed.
- E. Where equipment is intended to contain fluids, it shall be filled and tested for leaks as recommended by the equipment manufacturer.
- F. Equipment shall be operated for a reasonable time to determine any undue vibration, heating of parts, or other improper operation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

- A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.
- B. Comply with NEMA MG 1 unless otherwise indicated.
- C. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet (1000 m) above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.

SECTION 230513 – COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

- B. Efficiency: Energy efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
 - 1. For motors with 2:1 speed ratio, consequent pole, single winding.
 - 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Multispeed Motors: Separate winding for each speed.
- F. Rotor: Random-wound, squirrel cage.
- G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- H. Temperature Rise: Match insulation rating.
- I. Insulation: Class F.
- J. Code Letter Designation:
 - 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 - 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - 1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 - 2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 - 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
- C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.

SECTION 230513 – COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

- 2. Split phase.
- 3. Capacitor start, inductor run.
- 4. Capacitor start, capacitor run.

- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

- D. Motors 1/20 HP and Smaller: Shaded-pole type.

- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Sleeves.
 - 2. Stack-sleeve fittings.
 - 3. Sleeve-seal systems.
 - 4. Sleeve-seal fittings.
 - 5. Grout.

1.3 SUBMITTALS

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

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.
- D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
- F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- G. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

2.2 STACK-SLEEVE 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. Smith, Jay R. Mfg. Co.

SECTION 230517 – SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
- B. 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.
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 1. Sealing Elements: EPDM-rubber or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 2. Pressure Plates: Stainless steel.
 3. Connecting Bolts and Nuts: Stainless steel 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.
- 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 (34.5-MPa), 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 (25-mm) 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 (50 mm) above finished floor level.
 - 3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) 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 Division 07 Section "Joint Sealants."
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

- A. Install stack-sleeve fittings in new slabs as slabs are constructed.
 - 1. Install fittings that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
 - 2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Division 07 Section "Sheet Metal Flashing and Trim."
 - 3. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level.
 - 4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 5. Using grout, seal the space around outside of stack-sleeve fittings.

SECTION 230517 – SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

- B. 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 Division 07 Section "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: Galvanized-steel-pipe sleeves
 - 2. Exterior Concrete Walls below Grade: Galvanized-steel-pipe sleeves with sleeve-seal system
 - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
 - 3. Concrete Slabs-on-Grade: Galvanized-steel-pipe sleeves with sleeve-seal system
 - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
 - 4. Concrete Slabs above Grade: Galvanized-steel-pipe sleeves]
 - 5. Interior Partitions: Galvanized-steel-pipe sleeves

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.

1.3 SUBMITTALS

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

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated and rough-brass finish and setscrew fastener.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.
- C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.
- D. Split-Casting Brass Type: With polished, chrome-plated and rough-brass finish and with concealed hinge and setscrew.
- E. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed hinge, and spring-clip fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls and ceilings.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.

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- b. Chrome-Plated Piping: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge.
 - d. Bare Piping at Wall in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
 - e. Bare Piping at Wall in Finished Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
 - g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge.
 - h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated or rough-brass finish.
 - i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge.
 - j. Bare Piping in Equipment Rooms: One-piece, cast-brass or split-casting brass type with polished, chrome-plated or rough-brass finish.
 - k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge.
- C. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
- 1. New Piping: One-piece, floor-plate type.

3.2 FIELD QUALITY CONTROL

- A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Pipe labels.
 - 4. Duct labels.
 - 5. Stencils.
 - 6. Valve tags.
 - 7. Warning tags.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
 - 1. Material and Thickness: Brass, 0.032-inch, Stainless steel, 0.025-inch or anodized

SECTION 230553 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

- aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
 - 3. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 4. Fasteners: Stainless-steel rivets or self-tapping screws.
 - 5. 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), plus 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 (A4) 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.

2.2 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. Letter Color: Black.
- C. Background Color: White.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
- F. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

SECTION 230553 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

- 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: At least 1-1/2 inches (38 mm) high.

2.4 DUCT LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Black.
- C. Background Color: White.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
- F. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. 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 (38 mm) high.

2.5 STENCILS

- A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/4 inches (32 mm) for ducts; and minimum letter height of 3/4 inch (19 mm) for access panel and door labels, equipment labels, and similar operational instructions.
 - 1. Stencil Material: Fiberboard or metal.
 - 2. Stencil Paint: Exterior, gloss, alkyd enamel or acrylic enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
 - 3. Identification Paint: Exterior, alkyd enamel or acrylic enamel in colors according to ASME A13.1 unless otherwise indicated.

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 Provide Owner with list of and identification information as follows:

- A. HVAC Power Ventilators – Tag, Location, Service Area, Manufacturer, Model Numbers, Serial Numbers, CFM
- B. Custom Outdoor Central-Station Air Handling Units – Tag, Location, Service Area, Manufacturer, Model Numbers, Serial Numbers, Capacity, Volts/Phase, CFM
- C. Room Air-Conditioners – Tag, Location, Service Area, Manufacturer, Model Numbers, Serial Numbers, Capacity, Volts/Phase, CFM

3.3 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Interior Painting."
- B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels with painted, color-coded bands or rectangles, complying with ASME A13.1, on each piping system.
 - 1. Identification Paint: Use for contrasting background.
 - 2. Stencil Paint: Use for pipe marking.
- C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
 - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

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D. Pipe Label Color Schedule:

1. Refrigerant Piping:

- a. Background Color: Blue.
- b. Letter Color: White.

3.5 DUCT LABELS

- A. Stenciled Duct Labels Option: Provide stenciled labels, showing service and flow direction.
- B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 20 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.6 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 1. Valve-Tag Size and Shape: 2 inches, round.
 2. Valve-Tag Color: Natural.
 3. Letter Color: Black.

3.7 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Division 23 Specifications apply to this section.
- C. Project drawings.
- D. Refer to commissioning and testing requirements in sections 010800, 010801, and 017900 and 230800.

1.2 SUMMARY

- A. This Section includes Contractor and TAB Contractor's requirements to produce design objectives for the following:
 - 1. Air Systems:
 - a. Constant-volume air systems – Exhaust systems.
 - 2. HVAC equipment quantitative-performance settings.
 - 3. Laboratory fume hood airflow balancing.
 - 4. Reporting results of activities and procedures specified in this Section.

1.3 DEFINITIONS

- A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to indicated quantities.
- C. Barrier or Boundary: Construction, either vertical or horizontal, such as walls, floors, and ceilings that are designed and constructed to restrict the movement of airflow, smoke, odors, and other pollutants.
- D. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.
- E. NC: Noise criteria.
- F. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.
- G. RC: Room criteria.
- H. Report Forms: Test data sheets for recording test data in logical order.

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- I. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.
- J. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.
- K. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- L. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.
- M. TAB: Testing, adjusting, and balancing.
- N. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- O. Test: A procedure to determine quantitative performance of systems or equipment.
- P. Testing, Adjusting, and Balancing (TAB) Firm: The entity responsible for performing and reporting TAB procedures.

1.4 SCOPE OF WORK

- A. This specification section is included herein to assist and inform the Contractor of the standards, requirements, and scope of the work to be performed by the Commonwealth's TAB Agency.
- B. Contractor shall provide complete coordination of TAB Scope as required for Start-up, Commissioning, and Balancing. This scope along with commissioning controls shall be included as critical path on the Project Schedule.

1.5 SUBMITTALS

- A. Qualification Data: Within 15 days from Contractor's Notice to Proceed, submit 6 copies of evidence that TAB firm and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 60 days from Contractor's Notice to Proceed, submit 6 copies of the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 90 days from Contractor's Notice to Proceed, submit 6 copies of TAB strategies and step-by-step procedures as specified in Part 3 "Preparation" Article. Include a complete set of report forms intended for use on this Project.
- D. Certified TAB Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.
- E. Sample Report Forms: Submit two sets of sample TAB report forms.
- F. Warranties specified in this Section.

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1.6 QUALITY ASSURANCE

- A. TAB Firm Qualifications: Engage a TAB firm certified by AABC or NEBB.
- B. TAB Conference: 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.
 - 1. Agenda Items: Include at least the following:
 - a. Submittal distribution requirements.
 - b. The Contract Documents examination report.
 - c. TAB plan.
 - d. Work schedule and Project-site access requirements.
 - e. Coordination and cooperation of trades and subcontractors.
 - f. Coordination of documentation and communication flow.
- C. Certification of TAB Reports: Certify TAB field data reports. This certification includes 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.
- D. TAB Report Forms: 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 TABB "HVAC Systems - Testing, Adjusting, and Balancing." or TAB firm's forms approved by Commissioning Agent and Architect.
- E. Instrumentation Type, Quantity, and Accuracy: As described in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."
- F. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by instrument manufacturer.
 - 1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.
- G. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2007, Section 7.2.2 - "Air Balancing."
- H. ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2007, Section 6.7.2.3 - "System Balancing."

1.7 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.

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1.8 COORDINATION

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.
- B. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- C. Provide TAB only after verification by Contractor that systems are ready for balancing.
- D. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

1.9 CONTRACTOR PREPARATION AND COORDINATION REQUIREMENTS – GENERAL

- A. Shop drawings, submittal data, up-to-date revisions, change orders, and other data required for planning, preparation, and execution of the TAB work shall be provided to the TAB Agency no later than 30 days prior to the start of TAB work.
- B. System installation and equipment startup shall be complete prior to the TAB Agency's being notified to begin.
- C. The building control system shall be complete and operational. The Building Control system (sub)contractor shall install all necessary computers and computer programs, and make these operational. Assistance shall be provided as required for reprogramming, coordination, and problem resolution.
- D. All test points, balancing devices, identification tags, etc. shall be accessible and clear of insulation and other obstructions that would impede TAB procedures.
- E. Qualified installation or startup personnel shall be readily available for the operation and adjustment of the systems. Assistance shall be provided as required for coordination and problem resolution.

1.10 CONTRACTOR PREPARATION AND COORDINATION REQUIREMENTS – HVAC CONTROLS

- A. Written notice shall be submitted through the General Contractor to the Architect-Engineer stating that the Control System is operating and controlling the HVAC System.
- B. The Control (sub)contractor shall have entered all data needed for the TAB Agency to begin work.
- C. The Control (sub)contractor shall be available to correct any problems that the TAB Agency may encounter with the systems.
- D. All costs for additional work by the TAB Agency due to the Contractor's failure to comply with the above shall be paid by the Contractor and any subcontractor(s) for HVAC controls.

1.11 CONTRACTOR PREPARATION AND COORDINATION REQUIREMENTS – MECHANICAL

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- A. Written notice shall be submitted through the General Contractor to the Architect stating that the HVAC system is operational and ready for the TAB Agency.
- B. The Mechanical subcontractor shall have proved all units operational and all air outlets in the full open position.
- C. The Mechanical Contractor shall be available to correct any problems that the TAB Agency might have with any equipment or systems.
- D. The Mechanical Contractor shall furnish and install any replacement sheaves, pulleys and drive belts required for flow adjustments, as determined by the TAB Agency. Adjustable sheaves shall be selected so that the final adjustment position is in the middle third of the total adjustment range.
- E. All costs for additional work by the TAB Agency due to the Contractor's failure to comply with the above shall be paid by the Contractor and any subcontractor(s) for mechanical work

1.12 CONTRACTOR PREPARATION AND COORDINATION REQUIREMENTS – DUCTWORK

- A. Ductwork air leakage testing shall be performed by the TAB Agency.
- B. The ductwork/sheetmetal subcontractor shall promptly correct any related problems discovered by the leakage tests.
- C. All costs associated with retesting and/or delays or other problems which impede the TAB Agency from performing such testing shall be paid by the contractor and any subcontractor(s) for ductwork.

1.13 WARRANTY

- A. Special Guarantee: Provide a guarantee on forms stating that National Balancing Agency will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee shall include the following provisions:
 - 1. The certified TAB firm has tested and balanced systems according to the Contract Documents.
 - 2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

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1. Contract Documents are defined in the General and Supplementary Conditions of Contract.
 2. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B. Examine approved submittal data of HVAC systems and equipment.
- C. Examine Project Documents described in Division 01 Section "Project Documents."
- D. Examine design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data including fan and pump curves. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.
- F. Examine system and equipment test reports.
- G. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- H. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- I. Examine HVAC equipment to ensure that clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- J. Verify terminal units operation, such as variable-air-volume boxes, to verify that they are accessible and their controls are connected and functioning, before balancing.
- K. Examine system pumps to ensure absence of entrained air in the suction piping.
- L. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 DEFICIENCIES

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- A. Any deficiencies in the installation or performance of a system or component observed by the TAB Agency shall be brought to the attention of the appropriate responsible person.
- B. The work necessary to correct items on the deficiency listing shall be performed and verified by the affected contractor before the TAB Agency returns to retest. Unresolved deficiencies shall be noted in the final report.

3.3 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system readiness checks and prepare system readiness reports. Verify the following:
 - 1. Permanent electrical power wiring is complete.
 - 2. Hydronic systems are filled, clean, and free of air.
 - 3. Automatic temperature-control systems are operational.
 - 4. Equipment and duct access doors are securely closed.
 - 5. Balance, smoke, and fire dampers are open.
 - 6. Isolating and balancing valves are open and control valves are operational.
 - 7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 - 8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in any and all of the following standards: 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" and SMACNA's TABB "HVAC Systems - Testing, Adjusting, and Balancing".
 - 1. Comply with requirements in ASHRAE 62.1-2007, Section 7.2.2 - "Air Balancing."
 - 2. The requirements of this section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.
- C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- E. Check airflow patterns from the outside-air louvers and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling unit components.
- L. Check for proper sealing of air duct system.

3.6 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure fan static pressures to determine actual static pressure as follows:
 - a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - 2. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - a. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.

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3. Measure static pressures entering and leaving other devices such as sound traps, heat recovery equipment, and air washers, under final balanced conditions.
 4. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors with calculated system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.
 5. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes.
 6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full cooling, full heating, economizer, and any other operating modes to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 2. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure terminal outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust terminal outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.7 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
1. Manufacturer, model, and serial numbers.
 2. Motor horsepower rating.
 3. Motor rpm.
 4. Efficiency rating.
 5. Nameplate and measured voltage, each phase.
 6. Nameplate and measured amperage, each phase.
 7. Starter thermal-protection-element rating.

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- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass for the controller to prove proper operation. Record observations, including controller manufacturer, model and serial numbers, and nameplate data.

3.8 PROCEDURES FOR TEMPERATURE MEASUREMENTS

- A. During TAB, report the need for adjustment in temperature regulation within the automatic temperature-control system.
- B. Coordinating with the commissioning of the project, measure indoor wet- and dry-bulb temperatures every other hour for a period of two successive eight-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.
- C. Measure outside-air, wet- and dry-bulb temperatures.

3.9 DUCT LEAKAGE TESTING:

- A. The installing contractor shall isolate and seal sections of ductwork for testing. TAB shall verify 10% of the ductwork pressure tests during project inspections. Contractor will be required to re-seal the entire duct system upon failure of any system test. Refer to ductwork specifications.

3.10 TOLERANCES

- A. Set HVAC system airflow and water flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus 5 to plus 10 percent.
 - 2. Air Outlets and Inlets: Minus 5 to plus 5 percent.
 - 3. Heating-Water Flow Rate: Minus 5 to plus 5 percent.

3.11 PROJECT REPORTS

- A. Final TAB Report – The TAB Agency shall submit the final TAB report for review by the engineer. All outlets, devices, HVAC equipment, etc., shall be identified, along with a numbering system corresponding to report unit identification. The TAB Agency shall submit an “National Project Performance Guaranty” assuring that the project systems were tested, adjusted and balanced in accordance with the project specifications and National Standards.
- B. Submit three (3) copies of the Final TAB Report to the Architect-Engineer, and (1) copy to the Project Manager from the Division of Engineering and Contract Administration.
- C. Payments for the TAB work shall be contingent upon the proper submittal and approval of the TAB reports.

3.12 FINAL REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in three-ring binder, tabulated and divided into sections by tested and balanced systems.
- B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
 - 1. Include a list of instruments used for procedures, along with proof of calibration.
- C. Final Report Contents: In addition to certified field report data, include the following:
 - 1. Pump curves.
 - 2. Fan curves.
 - 3. Manufacturers' test data.
 - 4. Field test reports prepared by system and equipment installers.
 - 5. Other information relative to equipment performance, but do not include Shop Drawings and Product Data.
- D. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:
 - 1. Title page.
 - 2. Name and address of TAB firm.
 - 3. Project name.
 - 4. Project location.
 - 5. Architect's name and address.
 - 6. Engineer's name and address.
 - 7. Contractor's name and address.
 - 8. Report date.
 - 9. Signature of TAB firm who certifies the report.
 - 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 - 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 - 12. Nomenclature sheets for each item of equipment.
 - 13. Data for terminal units, including manufacturer, type size, and fittings.
 - 14. Notes to explain why certain final data in the body of reports varies from indicated values.
 - 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outside-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.

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- E. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outside, supply, return, and exhaust airflows.
 2. Water and steam flow rates.
 3. Duct, outlet, and inlet sizes.
 4. Pipe and valve sizes and locations.
 5. Terminal units.
 6. Balancing stations.
 7. Position of balancing devices.
- F. Roof Top Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data: Include the following:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches (mm), and bore.
 - i. Sheave dimensions, center-to-center, and amount of adjustments in inches (mm).
 - j. Number of belts, make, and size.
 - k. Number of filters, type, and size.
 2. Motor Data:
 - a. Make and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches (mm), and bore.
 - f. Sheave dimensions, center-to-center, and amount of adjustments in inches (mm).
 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm (L/s).
 - b. Total system static pressure in inches wg (Pa).
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg (Pa).
 - e. Filter static-pressure differential in inches wg (Pa).
 - f. Preheat coil static-pressure differential in inches wg (Pa).
 - g. Cooling coil static-pressure differential in inches wg (Pa).
 - h. Heating coil static-pressure differential in inches wg (Pa).
 - i. Outside airflow in cfm (L/s).
 - j. Return airflow in cfm (L/s).
 - k. Outside-air damper position.
 - l. Return-air damper position.
 - m. Vortex damper position.
- G. Apparatus-Coil Test Reports:

1. Coil Data:
 - a. System identification.
 - b. Location.
 - c. Coil type.
 - d. Number of rows.
 - e. Fin spacing in fins per inch (mm) o.c.
 - f. Make and model number.
 - g. Face area in sq. ft. (sq. m).
 - h. Tube size in NPS (DN).
 - i. Tube and fin materials.
 - j. Circuiting arrangement.
 2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm (L/s).
 - b. Average face velocity in fpm (m/s).
 - c. Air pressure drop in inches wg (Pa).
 - d. Outside-air, wet- and dry-bulb temperatures in deg F (deg C).
 - e. Return-air, wet- and dry-bulb temperatures in deg F (deg C).
 - f. Entering-air, wet- and dry-bulb temperatures in deg F (deg C).
 - g. Leaving-air, wet- and dry-bulb temperatures in deg F (deg C).
 - h. Water flow rate in gpm (L/s).
 - i. Water pressure differential in feet of head or psig (kPa).
 - j. Entering-water temperature in deg F (deg C).
 - k. Leaving-water temperature in deg F (deg C).
 - l. Refrigerant expansion valve and refrigerant types.
 - m. Refrigerant suction pressure in psig (kPa).
 - n. Refrigerant suction temperature in deg F (deg C).
 - o. Inlet steam pressure in psig (kPa).
- H. Gas-Fired Equipment Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:
1. Unit Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Fuel type in input data.
 - g. Output capacity in Btuh (kW).
 - h. Ignition type.
 - i. Burner-control types.
 - j. Motor horsepower and rpm.
 - k. Motor volts, phase, and hertz.
 - l. Motor full-load amperage and service factor.
 - m. Sheave make, size in inches (mm), and bore.
 - n. Sheave dimensions, center-to-center, and amount of adjustments in inches (mm).
 2. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm (L/s).
 - b. Entering-air temperature in deg F (deg C).

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- c. Leaving-air temperature in deg F (deg C).
- d. Air temperature differential in deg F (deg C).
- e. Entering-air static pressure in inches wg (Pa).
- f. Leaving-air static pressure in inches wg (Pa).
- g. Air static-pressure differential in inches wg (Pa).
- h. Low-fire fuel input in Btuh (kW).
- i. High-fire fuel input in Btuh (kW).
- j. Manifold pressure in psig (kPa).
- k. High-temperature-limit setting in deg F (deg C).
- l. Operating set point in Btuh (kW).
- m. Motor voltage at each connection.
- n. Motor amperage for each phase.
- o. Heating value of fuel in Btuh (kW).

- I. Fan Test Reports: For supply, return, and exhaust fans, include the following:
 - 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches (mm), and bore.
 - h. Sheave dimensions, center-to-center, and amount of adjustments in inches (mm).
 - 2. Motor Data:
 - a. Make and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches (mm), and bore.
 - f. Sheave dimensions, center-to-center, and amount of adjustments in inches (mm).
 - g. Number of belts, make, and size.
 - 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm (L/s).
 - b. Total system static pressure in inches wg (Pa).
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg (Pa).
 - e. Suction static pressure in inches wg (Pa).
- J. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 - 1. Report Data:
 - a. System and air-handling unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F (deg C).
 - d. Duct static pressure in inches wg (Pa).
 - e. Duct size in inches (mm).
 - f. Duct area in sq. ft. (sq. m).
 - g. Indicated airflow rate in cfm (L/s).
 - h. Indicated velocity in fpm (m/s).
 - i. Actual airflow rate in cfm (L/s).
 - j. Actual average velocity in fpm (m/s).
 - k. Barometric pressure in psig (Pa).
 - l. Pressure testing result/leakage.

K. Air-Terminal-Device Reports:

1. Unit Data:
 - a. System and air-handling unit identification.
 - b. Location and zone.
 - c. Test apparatus used.
 - d. Area served.
 - e. Air-terminal-device make.
 - f. Air-terminal-device number from system diagram.
 - g. Air-terminal-device type and model number.
 - h. Air-terminal-device size.
 - i. Air-terminal-device effective area in sq. ft. (sq. m).
2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm (L/s).
 - b. Air velocity in fpm (m/s).
 - c. Preliminary airflow rate as needed in cfm (L/s).
 - d. Preliminary velocity as needed in fpm (m/s).
 - e. Final airflow rate in cfm (L/s).
 - f. Final velocity in fpm (m/s).
 - g. Space temperature in deg F (deg C).

L. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:
 - a. System and air-handling unit identification.
 - b. Location and zone.
 - c. Room or riser served.
 - d. Coil make and size.
 - e. Flowmeter type.
2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm (L/s).
 - b. Entering-water temperature in deg F (deg C).
 - c. Leaving-water temperature in deg F (deg C).
 - d. Water pressure drop in feet of head or psig (kPa).
 - e. Entering-air temperature in deg F (deg C).
 - f. Leaving-air temperature in deg F (deg C).

M. Sound Measurement Reports: Record sound measurements on octave band and dBA test forms and on an NC or RC chart indicating the decibel level measured in each frequency band for both "background" and "HVAC system operating" readings. Record each tested location on a separate NC or RC chart. Record the following on the forms:

1. Date and time of test. Record each tested location on its own NC curve.
2. Sound meter manufacturer, model number, and serial number.
3. Space location within the building including floor level and room number.
4. Diagram or color photograph of the space showing the measurement location.
5. Time weighting of measurements, either fast or slow.
6. Description of the measured sound: steady, transient, or tonal.

7. Description of predominant sound source.

N. Indoor-Air Quality Measurement Reports for Each HVAC System:

1. HVAC system designation.
2. Date and time of test.
3. Outdoor temperature, relative humidity, wind speed, and wind direction at start of test.
4. Room number or similar description for each location.
5. Measurements at each location.
6. Observed deficiencies.

O. Instrument Calibration Reports:

1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.13 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the Final Report.

2. Randomly check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure water flow of at least 5 percent of terminals.
 - c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - d. Measure sound levels at two locations.
 - e. Measure space pressure of at least 10 percent of locations.
 - f. Verify that balancing devices are marked with final balance position.
 - g. Note deviations to the Contract Documents in the Final Report.

B. Final Inspection:

1. After initial inspection is complete and evidence by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Owner and Architect.
2. TAB firm test and balance engineer shall conduct the inspection in the presence of Owner and Architect.
3. Owner and Architect shall randomly select measurements documented in the final report to be rechecked. The rechecking shall be limited to either 10 percent of the total measurements recorded, or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If the rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
6. TAB firm shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes and resubmit the final report.
7. Request a second final inspection. If the second final inspection also fails, Owner shall contract the services of another TAB firm to complete the testing and balancing in accordance with the Contract Documents and deduct the cost of the services from the final payment.

3.14 ADDITIONAL TESTS

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

END OF SECTION

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:

1. Insulation Materials:
 - a. Flexible elastomeric.
 - b. Mineral fiber.
 - c. Polystyrene.
2. Adhesives.
3. Sealants.
4. Factory-applied jackets.
5. Field-applied jackets.
6. Tapes.
7. Securements.
8. Corner angles.

B. Related Sections:

1. Division 21 Section "Fire-Suppression Systems Insulation."
2. Division 22 Section "Plumbing Insulation."
3. Division 23 Section "Metal Ducts" for duct liners.

1.2 SUBMITTALS

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

B. Shop Drawings:

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at pipe expansion joints for each type of insulation.
3. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
4. Detail removable insulation at piping specialties, equipment connections, and access panels.
5. Detail application of field-applied jackets.
6. Detail application at linkages of control devices.
7. Detail field application for each equipment type.

C. Field quality-control reports.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics:** Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

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. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Flexible Elastomeric: Closed-cell, sponge-or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
- G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- H. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide with factory-applied FSK jacket. For equipment applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- I. Mineral-Fiber, Preformed Pipe Insulation:
 1. Type I, 850 deg F (454 deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- J. Polystyrene: Rigid, extruded cellular polystyrene intended for use as thermal insulation. Comply with ASTM C 578, Type IV or Type XIII, except thermal conductivity (k-value) shall not exceed 0.26 Btu x in./h x sq. ft. x deg F (0.038 W/m x K) after 180 days of aging. Fabricate shapes according to ASTM C 450 and ASTM C 585.

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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 and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
 - 1. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Polystyrene Adhesive: Solvent-or water-based, synthetic resin adhesive with a service temperature range of minus 20 to plus 140 deg F (29 to plus 60 deg C).
- E. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 1. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- F. PVC Jacket Adhesive: Compatible with PVC jacket.
 - 1. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 2. Fire-and water-resistant, flexible, elastomeric sealant.
 - 3. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
 - 4. Color: Aluminum.
 - 5. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 2. Fire-and water-resistant, flexible, elastomeric sealant.
 - 3. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
 - 4. Color: White.
 - 5. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 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. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.5 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
1. Adhesive: As recommended by jacket material manufacturer.
 2. Color: White.
 3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45-and 90-degree, short-and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
 4. Factory-fabricated tank heads and tank side panels.
- C. Self-Adhesive Outdoor Jacket: 60-mil-(1.5-mm-) thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a crosslaminated polyethylene film covered with white aluminum-foil facing.

2.6 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Width: 3 inches (75 mm).
 2. Thickness: 11.5 mils (0.29 mm).
 3. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
 4. Elongation: 2 percent.
 5. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
 6. 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. Width: 3 inches (75 mm).
 2. Thickness: 6.5 mils (0.16 mm).
 3. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
 4. Elongation: 2 percent.
 5. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.

6. 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. Width: 2 inches (50 mm).
 2. Thickness: 6 mils (0.15 mm).
 3. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
 4. Elongation: 500 percent.
 5. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.
- D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
 1. Width: 2 inches (50 mm).
 2. Thickness: 3.7 mils (0.093 mm).
 3. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
 4. Elongation: 5 percent.
 5. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

2.7 SECUREMENTS

- A. Aluminum Bands: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H14, 0.020 inch (0.51 mm) thick, 1/2 inch wide with wing or closed seal.
- B. Insulation Pins and Hangers:
 1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.76 mm) thick by 2 inches (50 mm) square.
 - b. Spindle: Copper-or zinc-coated, low carbon steel, fully annealed, 0.106-inch(2.6-mm-) diameter shank, length to suit depth of insulation indicated.
 - c. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-(0.41-mm-) thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.
 - a. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
- C. Staples: Outward-clinching insulation staples, nominal 3/4-inch-(19-mm-) wide, stainless steel or Monel.
- D. Wire: 0.080-inch (2.0-mm) nickel-copper alloy.

2.8 CORNER ANGLES

- A. PVC Corner Angles: 30 mils (0.8 mm) thick, minimum 1 by 1 inch (25 by 25 mm), PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.
- B. Aluminum Corner Angles: 0.040 inch (1.0 mm) thick, minimum 1 by 1 inch (25 by 25 mm), aluminum according to ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105 or 5005; Temper H-14.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.

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2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch-(75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). 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 4 inches (100 mm) o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above ambient services, do not install insulation to the following:
1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Manholes.
 5. Handholes.
 6. Cleanouts.

3.3 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
 - 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
- C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
 - 4. Seal jacket to wall flashing with flashing sealant.
- D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches (50 mm).
 - 1. Comply with requirements in Division 07 Section "Penetration Firestopping" Firestopping and fire-resistive joint sealers.

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. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be

- butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
 6. Insulate flanges 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.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its

attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 MINERAL-FIBER INSULATION INSTALLATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
 - b. On duct sides with dimensions larger than 18 inches (450 mm), place pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Impale insulation over pins and attach speed washers.
 - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory-or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches (75 mm).

5. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches (450 mm) o.c.
 6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-(150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.
- B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
 - b. On duct sides with dimensions larger than 18 inches (450 mm), space pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory-or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches (75 mm).
 5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible

to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.

6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-(150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

3.7 FIELD-APPLIED JACKET INSTALLATION

- A. Install self-adhesive outdoor jackets according to manufacturer's recommendations.
- B. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.
 1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
 2. Inspect field-insulated equipment, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.
 3. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, one location of welded strainers, three locations of threaded valves, and one location of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:
 1. Supply, relief air, and return air in Mechanical Rooms as indicated.
- B. Items Not Insulated:

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1. Factory-insulated flexible ducts.
2. Factory-insulated plenums and casings.
3. Flexible connectors.
4. Vibration-control devices.
5. Factory-insulated access panels and doors.

3.10 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, Supply-Air, and Outside-Air Duct Insulation: Mineral-fiber blanket 2 inches thick and 1.5-lb/cu. ft. nominal density.
- B. Exposed, Supply-Air, Outside-Air, Relief and Return-Air Duct Insulation: Mineral-fiber board, 1-1/2 inches thick and 3.0-lb/cu. ft. nominal density. Areas without ceilings.

3.11 EQUIPMENT INSULATION SCHEDULE

- A. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.
- B. Insulate indoor and outdoor equipment in paragraphs below that is not factory insulated.
- D. Heating-Hot-Water Pump Insulation: Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. (48kg/cu. m) nominal density.
- E. Heating-Hot-Water Expansion/Compression Tank Insulation: Mineral-Fiber Pipe and Tank: 1 inch thick.
- F. Heating-Hot-Water Air-Separator Insulation: Mineral-Fiber Pipe and Tank: 2 inches thick.

3.12 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.

3.13 INDOOR PIPING INSULATION SCHEDULE

- A. Heating-Hot-Water Supply and Return, 200 Deg F (93 Deg C) and below: Insulation shall be one of the following:
 1. Mineral-Fiber, Preformed Pipe, Type I: 1½ inch thick., pipes < 1.5"; 2 inch thick, pipes > 1.5".
- B. Refrigerant Suction and Hot-Gas Piping:
 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches (38 mm) thick.

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- b. Flexible Elastomeric: 1 inch (25 mm) thick.
- c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.

3.14 OUTDOOR, PIPING INSULATION SCHEDULE

- A. Insulation shall be one of the following:
 - 1. Flexible Elastomeric: 2 inches thick.
 - 2. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.
 - 3. Polystyrene: 2 inches thick.

3.15 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Ducts and Plenums:
 - 1. None.
- D. Piping, Concealed:
 - 1. None.
- E. Piping, Exposed, below 8 feet:
 - 1. PVC 20 mils thick.

3.16 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Ducts and Pipes:
 - 1. Self-adhesive outdoor jacket.

END OF SECTION

PART 1 - GENERAL**1.1 SUMMARY**

- A. This Section includes refrigerant piping used for air-conditioning applications. Design is delegated to equipment manufacturer.

1.2 PERFORMANCE REQUIREMENTS

- 1. Suction Lines for Air-Conditioning Applications: 185 psig.
- 2. Hot-Gas and Liquid Lines: 325 psig.

1.3 SUBMITTALS

- A. Shop Drawings, Submit refrigeration diagram with design of routing, sizing, risers, etc.: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.
 - 1. Refrigerant piping as diagrammed is schematic only. Manufacturer of equipment shall size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

1.4 PRODUCT STORAGE AND HANDLING

- A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

PART 2 - PRODUCTS**2.1 COPPER TUBE AND FITTINGS**

- A. Copper Tube: ASTM B 88, Type K or L.
- B. Wrought-Copper Fittings: ASME B16.22.
- C. Wrought-Copper Unions: ASME B16.22.
- D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.
- E. Brazing Filler Metals: AWS A5.8.

F. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch-long assembly.
4. Pressure Rating: Factory test at minimum 500 psig.
5. Maximum Operating Temperature: 250 deg F.

2.2 VALVES AND SPECIALTIES**A. Diaphragm Packless Valves:**

1. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
2. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.
3. Operator: Rising stem and hand wheel.
4. Seat: Nylon.
5. End Connections: Socket, union, or flanged.
6. Working Pressure Rating: 500 psig.
7. Maximum Operating Temperature: 275 deg F.

B. Packed-Angle Valves:

1. Body and Bonnet: Forged brass or cast bronze.
2. Packing: Molded stem, back seating, and replaceable under pressure.
3. Operator: Rising stem.
4. Seat: Nonrotating, self-aligning polytetrafluoroethylene.
5. Seal Cap: Forged-brass or valox hex cap.
6. End Connections: Socket, union, threaded, or flanged.
7. Working Pressure Rating: 500 psig.
8. Maximum Operating Temperature: 275 deg F.

C. Check Valves:

1. Body: Ductile iron, forged brass, or cast bronze; globe pattern.
2. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
3. Piston: Removable polytetrafluoroethylene seat.
4. Closing Spring: Stainless steel.
5. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.
6. End Connections: Socket, union, threaded, or flanged.
7. Maximum Opening Pressure: 0.50 psig.
8. Working Pressure Rating: 500 psig.
9. Maximum Operating Temperature: 275 deg F.

D. Service Valves:

1. Body: Forged brass with brass cap including key end to remove core.
2. Core: Removable ball-type check valve with stainless-steel spring.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Copper spring.
5. Working Pressure Rating: 500 psig.

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- E. Safety Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
- F. Thermostatic Expansion Valves: Comply with ARI 750.
- G. Straight-Type Strainers:
 - 1. Body: Welded steel with corrosion-resistant coating.
 - 2. Screen: 100-mesh stainless steel.
 - 3. End Connections: Socket or flare.
 - 4. Working Pressure Rating: 500 psig.
 - 5. Maximum Operating Temperature: 275 deg F.
- H. Angle-Type Strainers:
 - 1. Body: Forged brass or cast bronze.
 - 2. Drain Plug: Brass hex plug.
 - 3. Screen: 100-mesh monel.
 - 4. End Connections: Socket or flare.
 - 5. Working Pressure Rating: 500 psig.
 - 6. Maximum Operating Temperature: 275 deg.
- I. Moisture/Liquid Indicators:
 - 1. Body: Forged brass.
 - 2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
 - 3. Indicator: Color coded to show moisture content in ppm.
 - 4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
 - 5. End Connections: Socket or flare.
 - 6. Working Pressure Rating: 500 psig.
 - 7. Maximum Operating Temperature: 240 deg F.
- J. Replaceable-Core Filter Dryers: Comply with ARI 730.
- K. Permanent Filter Dryers: Comply with ARI 730.
- L. Liquid Accumulators: Comply with ARI 495.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Suction Lines NPS 1-1/2 for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.
- B. Hot-Gas and Liquid Lines: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

- A. Install diaphragm packless valves in suction and discharge lines of compressor.

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- B. Install service valves for gage taps at strainers if they are not an integral part of strainers.
- C. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.
- D. Except as otherwise indicated, install diaphragm packless valves on inlet and outlet side of filter dryers.
- E. Install a full-sized, three-valve bypass around filter dryers.
- F. Install solenoid valves upstream from each expansion valve. Install solenoid valves in horizontal lines with coil at top.
- G. Install thermostatic expansion valves as close as possible to distributors on evaporators.
 - 1. Install valve so diaphragm case is warmer than bulb.
 - 2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
 - 3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.
- H. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.
- I. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for device being protected:
 - 1. Solenoid valves.
 - 2. Thermostatic expansion valves.
 - 3. Compressor.
- J. Install filter dryers in liquid line between compressor and thermostatic expansion valve, and in the suction line at the compressor.
- K. Install flexible connectors at compressors.

3.3 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 Shop Drawings.
- B. Install refrigerant piping according to ASHRAE 15.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- D. 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.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping adjacent to machines to allow service and maintenance.

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- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Select system components with pressure rating equal to or greater than system operating pressure.
- J. Refer to Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls" for solenoid valve controllers, control wiring, and sequence of operation.
- K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- L. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Division 08 Section "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.
- M. Slope refrigerant piping as follows:
 - 1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
 - 2. Install horizontal suction lines with a uniform slope downward to compressor.
 - 3. Install traps and double risers to entrain oil in vertical runs.
 - 4. Liquid lines may be installed level.
- N. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.
- O. Install pipe sleeves at penetrations in exterior walls and floor assemblies.
- P. Seal penetrations through fire and smoke barriers according to Division 07 Section "Penetration Firestopping."
- Q. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- R. Install sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation.
- S. Seal pipe penetrations through exterior walls according to Division 07 Section "Joint Sealants" for materials and methods.
- T. Identify refrigerant piping and valves according to Division 23 Section "Identification for HVAC Piping and Equipment."

3.4 PIPE JOINT CONSTRUCTION

- A. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
- B. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

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3.5 HANGERS AND SUPPORTS

- A. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
 - 2. Spring hangers to support vertical runs.
 - 3. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
- B. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:
 - 1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
 - 2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
 - 3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
 - 4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. Comply with ASME B31.5, Chapter VI.
 - 2. Test refrigerant piping and specialties. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
 - 3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.
 - a. Fill system with nitrogen to the required test pressure.
 - b. System shall maintain test pressure at the manifold gage throughout duration of test.
 - c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
 - d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.7 SYSTEM CHARGING

- A. Charge system using the following procedures:
 - 1. Install core in filter dryers after leak test but before evacuation.
 - 2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
 - 3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
 - 4. Charge system with a new filter-dryer core in charging line.

3.8 ADJUSTING

- A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

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- B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
- C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.
- D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
 - 1. Open shutoff valves in condenser water circuit.
 - 2. Verify that compressor oil level is correct.
 - 3. Open compressor suction and discharge valves.
 - 4. Open refrigerant valves except bypass valves that are used for other purposes.
 - 5. Check open compressor-motor alignment and verify lubrication for motors and bearings.
- E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION

PART 1 -GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round and flat-oval ducts and fittings.
3. Sheet metal materials.
4. Sealants and gaskets.
5. Hangers and supports.

B. Related Sections:

1. Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Division 23 Section "Nonmetal Ducts" for fibrous-glass ducts, thermoset fiber-reinforced plastic ducts, thermoplastic ducts, PVC ducts, and concrete ducts.
3. Division 23 Section "HVAC Casings" for factory-and field-fabricated casings for mechanical equipment.
4. Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

1.4 SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory-and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.

4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

C. Delegated-Design Submittal:

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: Calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation for selecting hangers and supports and seismic restraints.

D. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Perimeter moldings.

E. Welding certificates.

F. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code -Steel," for hangers and supports.

- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code -Steel," for hangers and supports.
 - 2. AWS D1.2/D1.2M, "Structural Welding Code -Aluminum," for aluminum supports.
 - 3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 -"Construction and System Start-Up."
- D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6.4.4 -"HVAC System Construction and Insulation."

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 1-4, "Transverse (Girth) 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 1-5, "Longitudinal Seams - Rectangular Ducts," 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 2, "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. Lindab Inc.
 - b. McGill AirFlow LLC.
 - c. SEMCO Incorporated.
 - d. Sheet Metal Connectors, Inc.
 - e. Spiral Manufacturing Co., Inc.

- 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 3-2, "Transverse Joints -Round Duct," 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 (1524 mm) in Diameter: Flanged.
- D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards -Metal and Flexible," Figure 3-1, "Seams -Round Duct and Fittings," 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 (2286 mm) in diameter with butt-welded longitudinal seams.
 - 2 Fabricate flat-oval ducts larger than 72 inches (1830 mm) 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 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "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."

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible" for acceptable materials, material thicknesses, 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: G60 (Z180) G90 (Z275).
 - 2 Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.4 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.

SECTION 233113 – METAL DUCTS

B. 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 (2500 Pa), positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Water-Based Joint and Seam Sealant:

- 1 Application Method: Brush on.
- 2 Solids Content: Minimum 65 percent.
- 3 Shore A Hardness: Minimum 20.
- 4 Water resistant.
- 5 Mold and mildew resistant.
- 6 VOC: Maximum 75 g/L (less water).
- 7 Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
- 8 Service: Indoor or outdoor.
- 9 Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. 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 For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

- 1 Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg (0.14 L/s per sq. m at 250 Pa) and shall be rated for 10-inch wg (2500-Pa) static-pressure class, positive or negative.
- 2 EPDM O-ring to seal in concave bead in coupling or fitting spigot.
- 3 Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.5 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1 (Table 4-1M), "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
 - 1 Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 - 2 Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
 - 3 Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

PART 3 -EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards -Metal and Flexible" unless otherwise indicated.
- C. Install round and flat-oval ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory-or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.

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- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. 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 (38 mm).
- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines."

3.4 OWNER TRAINING

- A. Prior to Substantial Completion, a Manufacturer's Representative, or other qualified representative, will conduct Owner Training for the Operations and Maintenance Staff. Training will occur only after system is 100% functional. Training will be scheduled with the attendees, listed below, at least two (2) weeks in advance. The Engineer will also be notified of training at that time.
- B. The representative performing training will have at least five (5) years of experience in conducting Owner training sessions. The Trainer will have been associated with the manufacturer for at least one (1) year.
- C. The individuals being trained shall receive:
 - 1. Written training agendas.
 - 2. Written training materials reviewed in a classroom setting.
 - 3. On-site explanation and demonstration of the equipment operation.
 - 4. Explanation of common equipment operations such as: sequencing, programming, shut-down, emergency operation, start-up, etc.
- D. Documentation will be digitally recorded with high sound and visual quality. The Contractor is responsible for recordings. Recordings will be submitted as part of the project close out documents.

3.5 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.6 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards -Metal and Flexible."
- B. 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. Outdoor, Supply-Air Ducts: Seal Class A.
 - 3. Outdoor, Exhaust Ducts: Seal Class C.
 - 4. Outdoor, Return-Air Ducts: Seal Class C.
 - 5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg (500 Pa) and Lower: Seal Class B.
 - 6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg (500 Pa): Seal Class A.
 - 7. Unconditioned Space, Exhaust Ducts: Seal Class C.
 - 8. Unconditioned Space, Return-Air Ducts: Seal Class B.
 - 9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg (500 Pa) and Lower: Seal Class C.
 - 10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg (500 Pa): Seal Class B.
 - 11. Conditioned Space, Exhaust Ducts: Seal Class B.
 - 12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.7 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible," Chapter 4, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1 Where practical, install concrete inserts before placing concrete.
 - 2 Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3 Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
 - 4 Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.
 - 5 Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible," Table 4-1 (Table 4-1M), "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches (610 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.

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- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum interval of 16 feet (5 m).
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.8 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.9 PAINTING

- A. 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. Paint materials and application requirements are specified in Division 09 painting Sections.

3.10 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Leakage Tests:
 - 1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 - 2. The installing contractor shall isolate and seal sections of ductwork for testing. Test the following systems:
 - a. All ducts with a Pressure Class Higher Than 3-Inch wg (750 Pa).
 - b. All laboratory exhaust ductwork shall be pressure tested.
 - 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, but after installing duct accessories and access doors.
 - 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. All testing results shall be based on one test per section only unless otherwise noted.
 - 7. Give seven days' advance notice for testing.
 - 8. Contractor shall re-seal the entire duct system upon failure of any system test.
- C. Duct System Cleanliness Tests:
 - 1. Visually inspect duct system to ensure that no visible contaminants are present.

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- 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.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.11 START UP

- A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

3.12 DUCT SCHEDULE

A. Supply Ducts:

1. Ducts Connected to Rooftop Units:

- a. Pressure Class: Positive 2-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 12.
- d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Equipment Not Listed Above:

- a. Pressure Class: Positive 2-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 6.
- d. SMACNA Leakage Class for Round and Flat Oval: 6.

B. Return Ducts:

1. Ducts Connected to Fan Coil Units and Terminal Units:

- a. Pressure Class: Positive or negative 2-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 12.
- d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Air-Handling Units:

- a. Pressure Class: Positive or negative 3-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 6.
- d. SMACNA Leakage Class for Round and Flat Oval: 6.

3. Ducts Connected to Equipment Not Listed Above:

- a. Pressure Class: Positive or negative 2-inch wg.
- b. Minimum SMACNA Seal Class: A.

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- c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
- C. Exhaust Ducts:
 - 1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 3-inch wg.
 - b. Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
- D. Intermediate Reinforcement:
 - 1. Galvanized-Steel Ducts: Galvanized steel.
- E. Double-Wall Duct Interstitial Insulation:
 - 1 Supply Air Ducts: 1 inch thick.
 - 2 Return Air Ducts: 1 inch thick.
 - 3 Exhaust Air Ducts: 1 inch thick.
- F. Elbow Configuration:
 - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm (5 m/s) or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio. 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm (5 to 7.6 m/s):
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio. 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes. 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
 - 2) Construction Standards -Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
 - c. Velocity 1500 fpm (7.6 m/s) or Higher:
 - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio. 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes. 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
 - 2) Construction Standards -Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
 - 2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.

- c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
- 3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible," Figure 3-3, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm (5 m/s) or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm (5 to 7.6 m/s): 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm (7.6 m/s) or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches and Larger in Diameter: Welded.
- G. Branch Configuration:
 - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-6, "Branch Connections."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Spin in.
 - 2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1000 fpm (5 m/s) or Lower: 90-degree tap.
 - b. Velocity 1000 to 1500 fpm (5 to 7.6 m/s): Conical tap.
 - c. Velocity 1500 fpm (7.6 m/s) or Higher: 45-degree lateral.

END OF SECTION

PART 1 -GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:

- 1. Manual volume dampers.
- 2. Fire dampers.
- 3. Smoke dampers.
- 4. Combination fire and smoke dampers.
- 5. Flange connectors.
- 6. Turning vanes.
- 7. Duct-mounted access doors.
- 8. Flexible connectors.
- 9. Flexible ducts.
- 10. Duct accessory hardware.

- B. Related Sections:

- 1. Division 23 Section "HVAC Gravity Ventilators" for roof-mounted ventilator caps.
- 2. Division 28 Section "Fire Detection and Alarm" for duct-mounted fire and smoke detectors.

1.3 SUBMITTALS

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

- 1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.

- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

- 1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Manual volume damper installations.
 - c. Control damper installations.
 - d. Fire-damper, smoke-damper, combination fire-and smoke-damper, installations, including sleeves; and duct-mounted access doors and remote damper operators.
 - e. Wiring Diagrams: For power, signal, and control wiring.

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- C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.
- D. Source quality-control reports.
- E. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with AMCA 500-D testing for damper rating.

1.5 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 -PRODUCTS

2.1 MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible" for acceptable materials, material thicknesses, 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: G60.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.2 MANUAL VOLUME DAMPERS**A. Standard, Steel, Manual Volume Dampers:**

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Air Balance Inc.; a division of Mestek, Inc.
 - b. American Warming and Ventilating; a division of Mestek, Inc.
 - c. Flexmaster U.S.A., Inc.
 - d. McGill AirFlow LLC.
 - e. METALAIRE, Inc.
 - f. Nailor Industries Inc.
 - g. Pottorff; a division of PCI Industries, Inc.
 - h. Ruskin Company.
 - i. Trox USA Inc.
 - j. Vent Products Company, Inc.
2. Standard leakage rating.
3. Suitable for horizontal or vertical applications.
4. Frames:
 - a. Hat-shaped, galvanized-steel channels, 0.064-inch (1.62-mm) minimum thickness.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
5. Blades:
 - a. Multiple or single blade.
 - b. Parallel-or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized steel, 0.064 inch (1.62 mm) thick.
6. Blade Axles: Galvanized steel.
7. Bearings:
 - a. Oil-impregnated bronze, Molded synthetic or Stainless-steel sleeve.
 - b. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
8. Tie Bars and Brackets: Galvanized steel.
9. Elevated Dial Regulator for use on insulated ducts.

2.3 FIRE DAMPERS**A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:**

1. Greenheck Fan Corporation.
2. McGill AirFlow LLC.
3. METALAIRE, Inc.

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- 4. Nailor Industries Inc.
- 5. Ruskin Company.
- B. Type: Static; rated and labeled according to UL 555 by an NRTL.
- C. Closing rating in ducts up to 6-inch wg static pressure class and minimum 4000-fpm velocity.
- D. Fire Rating: 1-1/2 hours.
- E. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034-inch (0.85-mm-) thick galvanized steel; with mitered and interlocking corners.
- F. Mounting Sleeve: Factory-or field-installed, galvanized sheet steel.
 - 1. Minimum Thickness: 0.052 or 0.138 inch (1.3 or 3.5 mm) thick, as indicated, and of length to suit application.
 - 2. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.
- G. Mounting Orientation: Vertical or horizontal as indicated.
- H. Blades: Roll-formed, interlocking, 0.034-inch-(0.85-mm-) thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch-(0.85-mm-) thick, galvanized-steel blade connectors.
- I. Horizontal Dampers: Include blade lock and stainless-steel closure spring.
- J. Heat-Responsive Device: Replaceable, 165 deg F rated, fusible links.
- K. Heat-Responsive Device: Electric resettable link and switch package, factory installed, 165 deg F (74 deg C) rated.

2.6 FLANGE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Nexus PDQ; Division of Shilco Holdings Inc.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Description: Add-on, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
- C. Material: Galvanized steel.
- D. Gage and Shape: Match connecting ductwork.

2.8 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Duro Dyne Inc.
 - 3. METALAIRE, Inc.
 - 4. SEMCO Incorporated.
 - 5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
 - 1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-3, "Vanes and Vane Runners," and 2-4, "Vane Support in Elbows."
- E. Vane Construction: Single wall for ducts up to 48 inches (1200 mm) wide and double wall for larger dimensions.

2.9 DUCT-MOUNTED ACCESS DOORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Warming and Ventilating; a division of Mestek, Inc.
 - 2. Ductmate Industries, Inc.
 - 3. Flexmaster U.S.A., Inc.
 - 4. Greenheck Fan Corporation.
 - 5. McGill AirFlow LLC.
 - 6. Nailor Industries Inc.
- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards -Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels -Round Duct."
 - 1. Door:
 - a. Double wall, rectangular.
 - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - c. Vision panel.
 - d. Hinges and Latches: 1-by-1-inch (25-by-25-mm) butt or piano hinge and cam latches.
 - e. Fabricate doors airtight and suitable for duct pressure class.

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2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:
 - a. Access Doors Less Than 12 Inches (300 mm) Square: No hinges and two sash locks.
 - b. Access Doors up to 18 Inches (460 mm) Square: Two hinges and two sash locks.
 - c. Access Doors up to 24 by 48 Inches (600 by 1200 mm): Three hinges and two compression latches.
 - d. Access Doors Larger Than 24 by 48 Inches (600 by 1200 mm): Four hinges and two compression latches with outside and inside handles.

2.10 DUCT ACCESS PANEL ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Ductmate Industries, Inc.
 2. Flame Gard, Inc.
 3. 3M.
- B. Labeled according to UL 1978 by an NRTL.
- C. Panel and Frame: Minimum thickness 0.0528-inch carbon 5steel.
- D. Fasteners: Carbon steel. Panel fasteners shall not penetrate duct wall.
- E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F (1093 deg C).
- F. Minimum Pressure Rating: 10-inch wg (2500 Pa), positive or negative.

2.11 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Ductmate Industries, Inc.
 2. Duro Dyne Inc.
 3. Ventfabrics, Inc.
 4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to 2 strips of 2-3/4-inch-(70-mm-) wide, 0.028-inch-(0.7-mm-) thick, galvanized sheet steel or 0.032-inch-(0.8-mm-) thick aluminum sheets. Provide metal compatible with connected ducts.
- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 1. Minimum Weight: 26 oz./sq. yd. (880 g/sq. m).

SECTION 233300 – AIR DUCT ACCESSORIES

2. Tensile Strength: 480 lbf/inch (84 N/mm) in the warp and 360 lbf/inch (63 N/mm) in the filling.
 3. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).
- F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
1. Minimum Weight: 24 oz./sq. yd. (810 g/sq. m).
 2. Tensile Strength: 530 lbf/inch (93 N/mm) in the warp and 440 lbf/inch (77 N/mm) in the filling.
 3. Service Temperature: Minus 50 to plus 250 deg F (Minus 45 to plus 121 deg C).
- G. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.
1. Minimum Weight: 16 oz./sq. yd. (542 g/sq. m).
 2. Tensile Strength: 285 lbf/inch (50 N/mm) in the warp and 185 lbf/inch (32 N/mm) in the filling.
 3. Service Temperature: Minus 67 to plus 500 deg F (Minus 55 to plus 260 deg C).
 4. H. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
- H. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
1. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 5. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 6. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch (6-mm) movement at start and stop.

2.12 FLEXIBLE DUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Flexmaster U.S.A., Inc.
 2. McGill AirFlow LLC.
 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Insulated, Flexible Duct: UL 181, Class 1, laminate or film supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.
1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
 2. Maximum Air Velocity: 4000 fpm (20 m/s).
 3. Temperature Range: Minus 10 to plus 160 deg F (Minus 23 to plus 71 deg C).
 4. Insulation R-value: Comply with ASHRAE/IESNA 90.1-2007.

SECTION 233300 – AIR DUCT ACCESSORIES

C. Flexible Duct Connectors:

1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches (75 through 460 mm), to suit duct size.
2. Non-Clamp Connectors: Liquid adhesive plus tape.

2.13 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 -EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards -Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having external insulation, install dampers with hat channels of same depth as insulation to extend damper arm above insulation.
 1. Install steel volume dampers in steel ducts.
 2. Install aluminum volume dampers in aluminum ducts.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install fire and smoke dampers according to UL listing.
- H. Connect ducts to duct silencers rigidly.
- I. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 1. On both sides of duct coils.
 2. At outdoor-air intakes and mixed-air plenums.

SECTION 233300 – AIR DUCT ACCESSORIES

3. At drain pans and seals.
 4. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
 5. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
 6. At each change in direction and at maximum 50-foot (15-m) spacing.
 7. Upstream from turning vanes.
 8. Upstream or downstream from duct silencers.
 9. Control devices requiring inspection.
 10. Elsewhere as indicated.
- J. Install access doors with swing against duct static pressure. Access doors shall be installed prior to duct leakage tests.
- K. Access Door Sizes:
1. One-Hand or Inspection Access: 8 by 5 inches (200 by 125 mm).
 2. Two-Hand Access: 12 by 6 inches (300 by 150 mm).
 3. Head and Hand Access: 18 by 10 inches (460 by 250 mm).
 4. Head and Shoulders Access: 21 by 14 inches (530 by 355 mm).
 5. Body Access: 25 by 14 inches (635 by 355 mm).
 6. Body plus Ladder Access: 25 by 17 inches (635 by 430 mm).
- L. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- M. Install flexible connectors to connect ducts to equipment.
- N. For fans developing static pressures of 5-inch wg (1250 Pa) and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- O. Connect terminal units to supply ducts directly or with maximum 2-foot lengths of flexible duct. Do not use flexible ducts to change directions.
- P. Connect diffusers to ducts with maximum 5-foot lengths of flexible duct clamped or strapped in place.
- Q. Connect flexible ducts to metal ducts with draw bands.
- R. Install duct test holes where required for testing and balancing purposes.
- S. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch (6-mm) movement during start and stop of fans.

3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
1. Operate dampers to verify full range of movement.
 2. Inspect locations of access doors and verify that purpose of access door can be performed.

SECTION 233300 – AIR DUCT ACCESSORIES

3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION

PART 1 -GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1 Rectangular and square ceiling diffusers.
- 2 Perforated diffusers.
- 3 Louver face diffusers.
- 4 Linear slot diffusers.

B. Related Sections:

- 1 Division 08 Section "Louvers and Vents" for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts.
- 2 Division 23 Section "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

- 1 Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
- 2 Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

- 1 Ceiling suspension assembly members.
- 2 Method of attaching hangers to building structure.
- 3 Size and location of initial access modules for acoustical tile.
- 4 Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
- 5 Duct access panels.

C. Source quality-control reports.

PART 2 -PRODUCTS

2.1 RECTANGULAR AND SQUARE CEILING DIFFUSERS:

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Krueger.
 2. Nailor Industries Inc.
 3. Price Industries.
 4. Titus.
 5. Tuttle & Bailey.
- a. Devices shall be specifically designed for variable-air-volume flows.
 - b. Material: Steel.
 - c. Finish: Baked enamel, white.
 - d. Face Size: See Drawings.
 - e. Accessories:
 - 1) Equalizing grid.
 - 2) Plaster ring.
 - 3) Safety chain.
 - 4) Wire guard.
 - 5) Sectorizing baffles.
 - 6) Operating rod extension.
- B. Perforated Diffuser:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Krueger.
 - b. Nailor Industries Inc.
 - c. Price Industries.
 - d. Titus.
 - e. Tuttle & Bailey.
 2. Devices shall be specifically designed for variable-air-volume flows.
 3. Material: Steel backpan and pattern controllers, with steel face.
 4. Finish: Baked enamel, white.
 5. Accessories:
 - a. Equalizing grid.
 - b. Plaster ring.
 - c. Safety chain.
 - d. Wire guard.
 - e. Sectorizing baffles.
 - f. Operating rod extension.

2.2

2.3 REGISTERS AND GRILLES

A. Fixed Face Grille:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Krueger.
 - b. Nailor Industries Inc.
 - c. Price Industries.
 - d. Titus.
 - e. Tuttle & Bailey.
2. Material: Steel.
3. Finish: Baked enamel, white.

2.4 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 -EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. 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. Make final locations where indicated, as much as practical. 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.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION

PART 1 - GENERAL

1.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Computer-room air conditioners shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.2 SUBMITTALS

- A. Shop Drawings: For computer-room air conditioners. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.
- B. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE Compliance:
 - 1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
 - 2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Ventilation Rate Procedures," and Section 7 - "Construction and Startup."
- C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004.

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of computer-room air conditioners that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WALL AND CEILING MOUNTED UNITS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. LG
 - 2. Mitsubishi
 - 3. Daikin
 - 4. Approved Equal.
- B. Description: Ductless Split System consisting of cabinet, fan, filters, and controls; for horizontal wall mounting, and remote condensing unit.
- C. Cabinet: Galvanized steel with baked-enamel finish, insulated with 1/2-inch-thick duct liner.
 - 1. Integral factory-supplied supply and return grille, with filter.
 - 2. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
- D. Supply-Air Fan: Forward curved, centrifugal, and directly driven by two-speed motor.
- E. Refrigeration System:
 - 1. Compressor: Hermetic, with oil strainer, internal motor overload protection, resilient suspension system, and crankcase heater.
 - 2. Refrigeration Circuit: Low-pressure switch, manual-reset high-pressure switch, thermal-expansion valve with external equalizer, sight glass with moisture indicator, service shutoff valves, charging valves, and charge of refrigerant.
 - 3. Refrigerant Evaporator Coil: Direct-expansion coil of seamless copper tubes expanded into aluminum fins.
 - a. Mount coil assembly over stainless-steel drain pan complying with ASHRAE 62.1-2004 and having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir.
 - 4. Remote Air-Cooled Refrigerant Condenser: Integral, copper-tube aluminum-fin coil with fan, direct driven.
 - 5. Split system shall have suction- and liquid-line compatible fittings and refrigerant piping for field interconnection.
- F. Filter: 1-inch-thick, disposable, glass-fiber media.
- G. Disconnect Switch: Nonautomatic, molded-case circuit breaker with handle accessible when panel is closed and capable of preventing access until switched to off position.
- H. Control System: Provide solid-state, wall-mounted control panel with start-stop switch, adjustable humidity set point, and adjustable temperature set point.
- I. =

SECTION 238123 – SPLIT SYSTEM AIR-CONDITIONERS

2.2 FAN MOTORS

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install Data Room air conditioners level and plumb, maintaining manufacturer's recommended clearances.
- B. Mount Indoor Air Conditioners: Install using manufacturers recommended hangers to support weight of air conditioner.
 1. Comply with requirements for hangers and supports specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
- C. Air-Cooled Refrigerant Condenser Mounting: Install using elastomeric pads. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."
 1. Minimum Deflection: 1/4 inch.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Water and Drainage Connections: Comply with applicable requirements in Division 22 Section "Domestic Water Piping." Provide adequate connections for condensate drain.
- D. Refrigerant Piping: Comply with applicable requirements in Division 23 Section "Refrigerant Piping." Provide shutoff valves and piping.

3.3 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 1. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 2. After installing computer-room air conditioners and after electrical circuitry has been energized, test for compliance with requirements.
 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. After startup service and performance test, change filters and flush humidifier.

SECTION 238123 – SPLIT SYSTEM AIR-CONDITIONERS

3.4 ADJUSTING

- A. Adjust initial temperature and humidity set points.
- B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section applies to all work specified in Division 26.
- B. Provide all required materials, labor, equipment, installation, fabrication, and testing required for a complete, safe, and fully operational system. System shall include all required materials and features whether specified or shown on drawings or not to comply with applicable codes and authorities having jurisdiction.
- C. The electrical installation shall be made in strict conformance with the latest edition and supplements in force at the time of bid opening of the 2020 National Electrical Code, the Rules and Regulations of the New Jersey Uniform Construction Code, the applicable Standards of the National Fire Protection Association, and applicable requirements of the Occupational Safety and Health Act of the United States Department of Labor. All materials and equipment employed shall be approved by and bear the label of Underwriters' Laboratories, Inc., where such labeling is made available by any manufacturer for said materials or equipment. All codes and regulations applicable shall be considered as jointly governing and the requirements of either and all will prevail. If it occurs that Drawings conflict with any applicable code, then this Contractor shall immediately bring same to attention of Architect or his representative for resolution.

1.3 DESCRIPTION OF DOCUMENTS

- A. The Drawings are generally diagrammatic and indicate the general design and arrangement of the proposed work. Do not scale drawings for the exact location of equipment and work. The exact routing of circuits and final location of all the electrical equipment, lighting fixtures, and other systems, unless specifically dimensioned on the Drawings, shall be subject to building and structural conditions, grid systems, and work of other trades involved in the construction, and subject to the approval of the Architect. The Contractor shall familiarize himself with the Contract Documents and shall be responsible for the final location of his particular equipment to suit field conditions encountered and to avoid interferences with other trades' work, without extra cost to the Owner or the Architect. The Contractor shall visit the job site to determine the job conditions. The Architect reserves the right to make minor changes in outlet and equipment locations at any time prior to rough-in of the electrical work without incurring any additional costs.
- B. Where sizes are not provided for material and equipment, the material and equipment shall be sized in accordance with the latest edition of the National Electrical Code and in accordance with the manufacturer's recommendations.

1.4 DEFINITIONS

- A. The term "finished space" shall mean any space designated for the general or specific use of the occupants.

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

- B. The term "concealed space" shall mean all furred spaces, pipe chases, spaces above finished ceilings, crawl spaces, and other areas not generally accessible to the occupants.
- C. The term "electrical space" as used in this division of the specifications shall mean any space designated primarily for the installation of electrical equipment.
- D. "Provide" - Furnish and install the specific item, equipment, and/or system.
- E. "Furnish" - Supply the specific item, equipment, and/or system.
- F. "Install" - Set in position and adjust for use the specific item, equipment, and/or system unless otherwise specifically noted to be installed by others.
- G. "Concealed" - Hidden from sight in walls, chases, furred spaces, above ceilings, underground, in concrete, etc.
- H. "Exposed" - Not hidden from sight.
- I. "Work" - Labor and installation, including materials, equipment, and systems required for completion of all portions of the project.

1.5 CODES AND STANDARDS

- A. Following is a list of abbreviations for codes and standards which are referred to in the Specifications. Where such reference is made, the code or standard becomes a part of these Specifications as if the code or standard were included herein. Reference is always to the latest edition of the code or standard unless otherwise specifically noted.

ANSI - American National Standards Institute, Inc.
NFPA - National Fire Protection Association
ASTM - American Society for Testing and Materials
NBS - National Bureau of Standards
NEMA - National Electrical Manufacturers Association
UL - Underwriters' Laboratories, Inc.
NEC - National Electrical Code
NESC - National Electrical Safety Code
IPCEA - Insulated Power Cable Engineers Assn.
IEEE - Institute of Electrical and Electronics Engineers
OSHA - Occupational Safety and Health Act
IES - Illuminating Engineering Society
JIC - Joint Industrial Council

1.6 GUARANTEES AND WARRANTIES

- A. This Contractor shall guarantee all equipment, apparatus, materials, and workmanship entering into the Contract to be the best of its respective kind and shall replace all parts at his expense which are defective within one year from final acceptance of the work by the Architect. Items of equipment which may have longer guarantees shall have warranties and guarantees completed, in order, and in effect at the time of final acceptance of the work by the Architect. This Contractor shall furnish all such warranties and guarantees at the time of final acceptance of the work.
- B. All work that is not installed in accordance with the Contract Documents shall be repaired or replaced at the direction of the Architect.

1.7 SUBMITTAL

- A. Submittals shall be made in accordance with Submittals paragraph in Division 1.
- B. Submittal data shall include specification data, such as metal gauges, finishes, optional accessories; even though such equipment and materials may be as specified. In addition, the submittal data shall include performance (certification) data, wiring diagrams where applicable, accurate dimensional data, and a recommended spare parts list. Outline or dimensional drawings alone are not acceptable.
- C. No roughing-in or connections shall be done until accepted equipment submittals are in the hands of the Contractor. It shall be this Contractor's responsibility to obtain accepted drawings and to make all connections in the neatest and most workmanlike manner possible. This Contractor shall coordinate with all other Contractors having any connections or roughing-in to the equipment.
- D. In general, normal catalog information (with the particular items underlined or otherwise denoted as being the submitted item) will be accepted as submittal data. Installation, operating and maintenance instructions must be that information specifically applicable to the items furnished, which is ordinarily supplied with the equipment to the Owner, for any modifications indicated. Wiring diagrams must be correct for the application. Generalized wiring diagrams, showing alternate methods of connection, will not be acceptable unless all unrelated sections are marked out. Submittal data sheets which indicate several different model numbers, figure numbers, optional accessories, or installation arrangements shall be clearly marked to indicate the specific items of equipment being furnished. Samples and certificates shall be furnished as requested. Submittal data must be complete for each piece of equipment; piecemeal data will not be processed.
- E. It shall be noted that acceptance of shop drawings by the Architect applies only to general design, arrangement, type, capacity, and quality. Such acceptance does not relieve the Contractor of the responsibility for furnishing the proper equipment.
- F. Corrections or comments made on the submittals during the Architect's review do not relieve the Contractor from compliance with the Drawings and Specifications. The Architect's review of submittals is only for general conformance with design concept and general compliance with the information given in the Contract Documents. The Contractor's responsibility includes, but is not limited to, conforming, and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating his work with that of all other trades, and performing his work in a safe and satisfactory manner.

1.8 SUBSTITUTIONS

- A. When this Contractor requests approval of substitute materials and/or equipment, except where under formal alternate proposal, it shall be understood that such substitution, if approved, will be made without cost to the Owner and Architect, regardless of changes. In all cases where substitutions affect other trades, the Contractor offering such substitutions shall reimburse all affected contractors for all necessary changes in their work.

1.9 OPERATION AND MAINTENANCE MANUALS

- A. Operation and maintenance data shall be submitted in accordance with the requirements of Division "GENERAL REQUIREMENTS".
- B. Furnish owner with three (3) bound sets of the O&M manuals at completion of project. The manuals shall be furnished by the manufacturer of each item of equipment or system. Each set is to be bound separately in a loose leaf binder. Manuals shall include Contractor's Name and

telephone numbers that can be called for service calls. The standard manufacturer's data shall be supplemented by such special instructions as may be necessary for the particular application. Also, include the following in the manuals:

- All project stamped acceptable shop drawings and copies of all certificates.
- Lubrication schedules and procedures
- Spare parts list, indicate all items that should be maintained at the site by owner.
- Maintenance and trouble-shooting suggestions for equipment.
- Non-Lien Affidavits
- Wiring Diagrams
- Certification of owner instruction of system and equipment
- Record drawings

- C. The operating instructions shall integrate each piece of equipment in any one system into a numbered step-by-step sequence of operation.
- D. The parts list shall consist of a complete list of replacement items with all component parts numbered for each piece of mechanical or electrical equipment and shall include directions for ordering said replacement items.
- E. Maintenance procedure shall outline required routine maintenance for all equipment and systems and instructions for repair of the equipment.

1.10 RECORD DRAWINGS

- A. This Contractor shall submit to the Owner Record Drawings. Drawings shall be identified with the Contractor's name, the date, and title "RECORD DRAWINGS" on the paper copies.

1.11 REMOVALS AND RELOCATIONS

- A. Perform all removal work required. Prepare remaining surfaces to receive new scheduled or specified materials. Finish surfaces to match adjacent if no additional work is scheduled or specified.
- B. Remove existing systems, materials, and equipment which are made obsolete, or which interfere with the construction. Reinstall any such systems, materials, and equipment which are required to complete the Project.
- C. Where existing systems, materials, or equipment are removed or revised, all conduit and wire which are no longer in service shall be removed. When outlets are covered up or are otherwise rendered inaccessible, all wiring shall be removed to the source. If a circuit that must remain in service is interrupted, it shall be reconnected by the most inconspicuous means so that it remains operational, with the same capacity as before. All building surfaces damaged, and openings left by removal of boxes, conduit, or other equipment shall be repaired. All holes left in junction boxes, switches, panels, and other equipment shall be closed.
- D. Where new openings are cut and concealed conduits or other electrical items are encountered, they shall be removed or relocated as required. Where conduit to be removed stubs through floors, walls, and ceilings, such conduit shall be removed to the point where the finished surfaces can be patched so that no evidence of the former installation remains.
- E. All devices, fixtures, equipment, and material determined by the Owner to be salvageable shall remain the property of the Owner and shall be stored at the location on the premises designed by the Owner. All other items and debris shall be disposed of by the Contractor.

1.12 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Services: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
1. Notify Architect no fewer than seven days in advance of proposed interruption of electrical services.
 2. Prior to making revisions to the existing services, the Contractor shall make certain that all items are thoroughly prepared. The actual work shall be accomplished at off-peak time as arranged with the Owner and Architect. Once the work is started, it shall be prosecuted to its completion to keep downtime to a minimum. The Contractor shall be prepared to temporarily feed the existing service in the event it becomes impossible to finish the scheduled work on time.
 3. The Contractor shall prepare a procedure for all work which will interrupt service to the Owner's equipment. This procedure shall include a step-by-step schedule that the Contractor proposes to follow in the performance of the work and the time involved in each step. The procedure shall be submitted to the Architect for approval at least two weeks in advance of the performance of the work.
 4. Indicate method of providing temporary electrical service. Contractor is responsible for providing all temporary electrical services.
 5. Do not proceed with interruption of electrical service without Architect's written permission.
 6. Comply with NFPA 70E.

1.13 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 3. To allow right of way for piping and conduit installed at required slope.
 4. So connecting raceways, cables, wireways, and cable trays will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames".
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping".
- E. The Contractor shall coordinate with all other contractors in locating conduit, light fixtures, boxes, sleeves, and equipment in order to avoid conflict with all other trades' work. No extra compensation will be allowed to cover the cost of relocating light fixtures, conduit, boxes, sleeves, or other electrical equipment found encroaching on space required by others.

1.14 ABBREVIATIONS

- A. Abbreviations may be used and indicated throughout the Specifications and Drawings, and will conform to the following list:

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

A or AMP	AMPERES, OR AMPACITY
AFF	ABOVE FINISHED FLOOR
C	CONDUIT
CB	CIRCUIT BREAKER
CKT	CIRCUIT
COMB	COMBINATION
CU	COPPER
EC	ELECTRICAL CONTRACTOR
EM	ON EMERGENCY CIRCUIT
EMT	ELECTRICAL METALLIC TUBING
FDS	FUSIBLE DISCONNECT SWITCH
GC	GENERAL CONTRACTOR
G	GREEN GROUNDING CONDUCTOR
GND	GROUND
HP	HORSEPOWER
JB	JUNCTION BOX
KVA	KILOVOLT AMPERES
KW	KILOWATTS
MC	MECHANICAL CONTRACTOR
MCC	MOTOR CONTROL CENTER
MTR	MOTOR
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NIC	NOT IN THIS CONTRACT
NL	NIGHT LIGHT
Ø	PHASE
PNL	PANEL
PVC	POLYVINYLCHLORIDE
RM	ROOM
STD	STANDARD

PART 2 PRODUCTS

2.1 GENERAL

- A. Material and equipment shall be furnished as specified in this section and each individual electrical section of these Specifications and shall be in strict accordance with applicable ANSI, NBS, ASTM, NESC, NEMA, IEEE, IPCEA, UL, NEC, OSHA and NFPA standards, codes, and specifications. Applicable codes, standards, and manufacturers' products referred to in these Specifications shall establish minimum requirements for materials and equipment furnished for this installation.
- B. When two or more articles of the same material or equipment are required, they shall be of the same manufacturer.
- C. New material and equipment shall be provided for the entire project, unless noted otherwise.

2.2 GROUT

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

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

- 2.3 Bolting shall be carbon steel conforming to ASTM A-307 with heavy hexagonal nuts.
- 2.4 Angles, Channels, Beams, Bars and Rods shall be steel conforming to ASTM A-36 as applicable.
- 2.5 ACCESS PANELS
 - A. Fire rated access panels shall be a prime steel door and frame assembly with flush lock release and interior latch release.
 - B. Panel shall have a 1½ hour B rating.
 - C. Access panels shall be nominal 16 inch by 16 inch, unless noted otherwise.
- 2.6 SLEEVES FOR RACEWAYS AND CABLES
 - A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
 - B. Sleeves for Rectangular Openings: Galvanized sheet steel.
 - 1. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

PART 3 EXECUTION

- 3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION
 - A. Comply with NECA 1.
 - B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
 - C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange, and install components and equipment to provide maximum possible headroom consistent with these requirements.
 - D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
 - E. Right of Way: Give to piping systems installed at a required slope.
 - F. Any electrical box, device, conduit, or enclosure installed in any fire rated column, wall, or ceiling shall not reduce the fire rating of said column or wall. The Contractor providing the device, box, conduit, or enclosure shall provide the required material to maintain the fire rating of the column, wall, or ceiling.
 - G. At penetrations of fire walls provide fire barrier penetration sealing system in conformance with Section FIRESTOPPING. The seal shall also be provided at all floor penetrations in a multi-

story building. The sealing system shall have a 3 hour rating when tested in accordance with the provisions of ASTM E-119. Installation of penetration sealing systems shall be in accordance with manufacturer's instructions.

- H. Provide cover plates where conduit and raceways pass through floor, ceiling, or walls and are exposed in finished rooms. Flanges shall fit snugly and shall be sized to cover the openings. All escutcheons shall be chromium plated wing type with fastening screws.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry.
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

3.3 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.4 EQUIPMENT CONNECTION AND WIRING

- A. Unless specifically noted otherwise on the Drawings or elsewhere in the Specifications, all wiring, and all equipment connections shall be provided by the Electrical Contractor, including equipment requiring electrical services furnished under other sections of the Specifications or by the Owner.
- B. The Electrical Contractor shall furnish and install all disconnect switches, NEC circuit protection, motor controllers, relays, and devices as required for all equipment to provide complete and operable electrical systems, unless the items are specifically noted elsewhere as being provided with, or as part of, the equipment.
- C. Electrical Contractor shall verify horsepower, voltage, phase, starting requirements, quantity of wires, and wattage of all equipment which requires electrical connections before equipment purchase or rough-in, and shall install feeders, branch circuits, and motor starting equipment and protection which are suitable in all respects for connection to, and operation with, the equipment furnished. Exact location of all equipment which requires electrical connection shall be verified with the equipment installer before rough-in.

3.5 EQUIPMENT INSTALLATION

- A. All equipment shall be installed at locations indicated and oriented so as to be easily accessible.
- B. Assembly and installation of equipment shall be in strict accordance with manufacturer's installation instructions. Equipment shall be securely anchored in place. Care shall be exercised to correctly orient equipment before securing in place.
- C. Equipment Mounting.
 - 1. All equipment with moving parts shall be mounted on vibration supports suitable for the purpose of minimizing noise and vibration transmission unless otherwise specified, and in addition, shall be isolated from external connections such as piping and raceways by means of flexible connectors, vibration absorbers, or other approved means.
- D. Cutting, Fitting, and Patching
 - 1. The Electrical Contractor shall do all cutting and drilling of masonry, steel, wood, or iron work and all fitting necessary for the proper installation of all electrical equipment and materials included in the Specifications or governed thereby.
 - 2. No cutting or drilling of the structure, of any kind, shall be done without first obtaining permission from the Architect. All cutting and drilling shall be done under the supervision of the Contractor in strict accordance with instructions furnished by the Architect.
 - 3. All patching and finishing shall be done by workmen skilled in the trades involved.

3.6 PERMITS, CERTIFICATES, LAWS AND ORDINANCES

- 1. The Electrical Contractor shall, at his own expense, procure all certificates and licenses required of him by law for the execution of his work. He shall comply with all Federal, State, and local laws, ordinances, rules, and regulations relating to the performance of the work. Refer to front end specification sections for permit requirements.
- 2. Following completion, a certificate of approval shall be secured from the local code enforcement authority and delivered to the Architect.

3.7 INSPECTION

1. The Electrical Contractor shall, at his own expense, furnish electrical inspection as required by the local code enforcing agency, when applicable. The Contractor shall notify the Electrical Inspector in writing upon the start of the job and a copy of the notice shall be sent to the Architect. The Contractor shall furnish certificates of final approval by the Electrical Inspection Bureau and final payment shall be withheld until he has presented the Architect with the aforementioned certificates of approval.

3.8 PAINTING

1. Refinish surfaces marred or damaged by electrical work to original or specified condition.
2. Replace marred or discolored factory, multiple coat, baked on finish surfaces. Minor inconspicuous scratches may be "touched-up".
3. The following items do not require painting.
 - a. Equipment with a factory baked on finish.
 - b. Receptacle and switch cover plates.
 - c. Faceplates of instruments, equipment, and control panels.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

1.4 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.1 CONDUCTORS AND CABLES

- 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. American Insulated Wire Corp.; a Leviton Company.
 - 2. General Cable Corporation.
 - 3. Senator Wire & Cable Company.
- B. Standards:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - 2. Conductor and Cable Marking: Comply with the wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- C. Copper Conductors: Comply with NEMA WC 70.
- D. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN and XHHW.

- E. Multiconductor Cabling: Comply with NEMA WC70 for metal clad cable, Type MC with ground conductor.

2.2 METAL-CLAD CABLE, TYPE MC

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.
- B. 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. Alpha Wire Company.
 - 2. General Cable Technologies Corporation.
 - 3. Service Wire Company.
 - 4. WESCO.
- C. Standards:
 - 1. Comply with UL 1569.
 - 2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Circuits:
 - 1. Single circuit, with insulated ground conductor.
- E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.
- F. Ground Conductor: Insulated.
- G. Conductor Insulation:
 - 1. Type TFN/THHN/THWN-2: Comply with UL 83.
 - 2. Type XHHW-2: Comply with UL 44.
- H. Armor: Steel, interlocked.

2.3 CONNECTORS AND SPLICES

- A. 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. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.
 - 4. 3M; Electrical Products Division.
 - 5. Tyco Electronics Corp.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Branch Circuits: Copper. Solid or stranded for No. 10 AWG and smaller; stranded for No. 8 AWG and larger. Minimum conductor size shall be No. 12 AWG.
- B. Control Circuits: Copper. Solid or stranded for No. 10 AWG and smaller. Minimum conductor size shall be No. 14 AWG.

3.2 CONDUCTOR INSULATION AND WIRING METHODS

- A. Exposed Branch Circuit: Type THHN-THWN, single conductors in raceway.
- B. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway. Metal clad cabling may be used for wiring within room from ceiling down to wall device. Metal clad cabling shall not be used for homeruns or from room to room.
- C. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- D. Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls and ceilings unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems".
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems".
- G. Metal clad cabling shall be secured at intervals not exceeding 6 foot and shall be secured within 12 inches of every box, cabinet, fitting, or other termination. Metal clad cable shall be supported by listed cable ties, steps, hangers, or other similar fittings designed for such use. Metal clad cables shall not be supported from ceiling supports or from twisted support wires.
- H. Provide anti-short bushings at all metal clad cable terminations.
- I. No wiring shall be pulled until construction is such that there is no danger of moisture entering open raceways. Protect all openings with caps or plugs until final connections are made. Conduit shall be swabbed clean before pulling conductors.

- J. No thermoplastic conductors shall be pulled through raceways at ambient temperatures below 33°F.
- K. All insulated bushings shall be installed before pulling conductors.
- L. All wiring in panel gutters, pull boxes, and other accessible enclosures shall be tied and bundled with cable ties.
- M. When channels of LED fixtures are used as a raceway, Type THHN conductors shall be used throughout the fixtures as the branch circuit.
- N. Wiring shall be installed continuously between terminal points indicated or dictated by field conditions without intermediate splices or taps unless specifically authorized by the Architect. Splices shall be made only in junction or terminal boxes.
- O. Conductors shall not be subject to pulling tension in excess of 50 percent of yield strength of conductor. Pulling lugs shall be attached to conductor with a sleeve or grip over the cable sheath to prevent slipping the insulation.
- P. Where terminals and splices are taped with insulation tape, apply a minimum of two layers of electrical tape, half-lapped.

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. All joints between conductors shall be made with wire connectors. Splices shall be in boxes and shall be accessible. Branch circuit conductors #10 AWG and smaller shall be spliced together using properly sized and listed spring type insulated conductors (i.e., wire nut). Conductors #8 AWG and larger shall be spliced using a non-insulated compression type sleeve or split-bolt connector with tape covering.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test conductors for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- C. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.

3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes methods and materials for grounding systems and equipment.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

2.2 CONNECTORS

- A. 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.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.

PART 3 EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid copper conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Grounding Conductors: Green-colored insulation.
- C. Conductor Terminations and Connections:

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all branch circuits and metal-clad, Type MC cable runs.
- B. Panelboards: Provide ground bushing on each incoming feeder conduit and connect to equipment ground bus.

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.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports.
 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.

1.3 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.

1.5 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Delegated Design Responsibility: For hangars and supports for electrical systems.

PART 2 PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
3. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 6. Toggle Bolts: All-steel springhead type.
 7. Hanger Rods: Threaded steel.

2.2 HOOKS

- A. Description: Prefabricated sheet metal cable supports for telecommunications and systems cable.

- B. 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. MonoSystems, Inc.
 - 2. Panduit Corp.
 - 3. Wiremold; Legrand North America, LLC.
 - 4. Erico, Caddy.
- C. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with TIA-569-D.
- E. Galvanized steel.
- F. J shape.

PART 3 EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
 - 2. Whenever possible, conduit shall be top mounted.
 - 3. Each conduit shall be individually clamped to supports.
 - 4. Parallel runs of conduit shall be grouped and fastened to walls with wall brackets of steel channel or knee-braced angles.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.
- E. Single runs of conduit shall be fastened to walls with one-hole straps or conduit clamps and to beams and trusses with beam clamps.
- F. Perforated band iron, piano wire, or steel wire hangers will not be permitted as conduit hangers or supports. Conduit shall not be hung from wire supporting ceiling grid systems.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 - 6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
 - 7. To Light Steel: Sheet metal screws.
 - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 HOOKS

- A. Size to allow a minimum of 25 percent future capacity without exceeding design capacity limits.
- B. Shall be supported by dedicated supports attached to structure or walls.
- C. Hook spacing shall allow no more than 6 inches of slack. The lowest point of the cables shall be no less than 6 inches adjacent to ceilings, mechanical ductwork and fittings, luminaires, power conduits, power, and telecommunications outlets, and other electrical and communications equipment.
- D. Space hooks no more than 5 feet on-center unless noted otherwise.
- E. Provide a hook at each change in direction.

3.4 Complete pathway installation before starting conductor installation.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, and enclosures for electrical wiring.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical non-metallic tubing.
- C. FMC: Flexible metal conduit.
- D. IMC: Intermediate metal conduit.
- E. LFMC: Liquidtight flexible metal conduit.
- F. LFNC: Liquidtight flexible non-metallic conduit.

1.4 SUBMITTALS

- A. Product Data: For conduit, boxes, and fittings.

1.5 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.1 METAL CONDUIT AND TUBING

- 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. AFC Cable Systems, Inc.
 - 2. Alflex Inc.
 - 3. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 5. Electri-Flex Co.
 - 6. Manhattan/CDT/Cole-Flex.

7. Maverick Tube Corporation.
 8. O-Z Gedney; a unit of General Signal.
 9. Wheatland Tube Company.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. IMC: ANSI C80.6.
- D. EMT: ANSI C80.3.
- E. FMC: Zinc-coated steel.
- F. LFMC: Flexible steel conduit with PVC jacket.
- G. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
1. Fittings for EMT: Steel compression type. Set screw and indentation type fittings are not allowed.
 2. Fittings for rigid steel conduit shall be threaded.
 3. Expansion fittings shall be galvanized ductile or malleable iron. Rigid conduit expansion fittings shall be DZ/Gedney type AX or approved equal. EMT fittings shall be DZ/Gedney type TX with compression fitting or approved equal.
- H. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

- A. Nonmetallic Conduit:
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. AFC Cable Systems; a part of Atkore International.
 - b. Anamet Electrical, Inc.
 - c. Arnco Corporation.
 - d. Electri-Flex Company.
 - e. Niedax Inc.
 - f. RACO; Hubbell.
 - g. Thomas & Betts Corporation; A Member of the ABB Group.
 2. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. ENT: Comply with NEMA TC 13 and UL 1653.
 4. LFNC: Comply with UL 1660.
- B. Nonmetallic Fittings:

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. AFC Cable Systems; a part of Atkore International.
 - b. Anamet Electrical, Inc.
 - c. Arnco Corporation.
 - d. Electri-Flex Company.
 - e. Niedax Inc.
 - f. RACO; Hubbell.
 - g. Thomas & Betts Corporation; A Member of the ABB Group.
2. Fittings, General: Listed and labeled for type of conduit, location, and use.
3. Fittings for ENT: Comply with NEMA TC 3; match to conduit or tubing type and material.
 - a. Fittings for LFNC: Comply with UL 514B.
4. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 BOXES AND ENCLOSURES

- 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. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 2. EGS/Appleton Electric.
 3. Erickson Electrical Equipment Company.
 4. Hoffman.
 5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
 6. O-Z/Gedney; a unit of General Signal.
 7. RACO; a Hubbell Company.
 8. Robroy Industries, Inc.; Enclosure Division.
 9. Scott Fetzer Co.; Adalet Division.
 10. Spring City Electrical Manufacturing Company.
 11. Thomas & Betts Corporation.
 12. Walker Systems, Inc.; Wiremold Company (The).
 13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, galvanized, cast iron with gasketed cover.

PART 3 EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
 - 1. Exposed Conduit: Rigid steel conduit.
 - 2. Concealed Conduit, Aboveground: Rigid Steel conduit, or EMT.
 - 3. Connected to vibrating equipment (including motor driven equipment): LFMC.
 - 4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R, cast malleable iron with threaded hubs and vellumoid gasket.
- B. Comply with the following indoor applications, unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: EMT or ENT as noted.
 - 2. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 3. Connection to Vibrating Equipment: FMC.
 - 4. Boxes and Enclosures: NEMA 250, Type 1.
 - a. Minimum outlet box depth shall be 2 1/8 inches.
 - b. Four inch octagonal outlet boxes shall be provided for wall and ceiling mounted fixtures. Outlet boxes shall be provided with fixture studs as required for mounting fixture. Swivel aligners shall be provided for all suspended fixtures.
 - c. Four inch square outlet boxes shall be provided for switches and convenience outlet boxes. A 4 inch by 2 1/8 inch handy box may be used for these devices when only one raceway enters the outlet box.
 - d. Square cornered boxes shall be provided in block and brick wall construction.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation. All conduit shall be swabbed and cleaned before pulling wire.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems". Conduit shall be securely fastened in place within 3 feet of each outlet box, junction box, cabinet, or fitting and shall be supported at least every 10 feet. No conduit shall be supported by the equipment to which it is connected.
- E. Install no more than the equivalent of three 90-degree bends in any conduit run.
- F. Conceal conduit and EMT within finished walls and ceilings unless otherwise indicated.

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

- G. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- H. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- I. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- J. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement and for motors.
 - 1. Use LFMC in damp or wet locations.
- K. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall.
- L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- M. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- N. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- O. Metallic conduit systems shall be electrically continuous in their entirety.
- P. Outlet boxes shall be provided for all devices. Pull boxes and junction boxes shall be provided at all points of splicing and tapping.
- Q. Boxes shall not be installed back-to-back in any wall but shall be staggered at least 12 inches apart.
- R. Boxes and supports shall be fastened to wood with wood screws or screw-type nails of equal holding strength with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry block and with screws or welded studs on steel work.
- S. Threaded studs driven in by powder charge and provided with lock washers and nuts, or nail-type nylon anchors, may be used in lieu of wood screws, expansion shields or machine screws.
- T. Outlet boxes in lay-in ceilings shall be supported by bar hangers anchored to the ceiling construction.
- U. Connections between outlet boxes on the opposite sides of a wall shall be made with conduit employing the use of two 90 degree bends from box to box.
- V. All boxes shall be accessible.
- W. Conduit shall be run with smooth, easy bends. Exposed conduit shall be run parallel or perpendicular to walls, ceilings, beams, and columns. Concealed conduit may be run at

angles other than parallel or perpendicular to building lines but shall be grouped in a neat and workmanlike manner. Dissimilar angles and crisscross arrangement will not be acceptable.

- X. Conduit bends and elbows shall be long-sweep, large radii when required by cable manufacturer.
- Y. Utilize grounding/bonding jumpers with u-bolt connections and tinned copper braid at expansion fittings.
- Z. Raceways that pass through insulated metal panels shall be sealed around penetration.

3.3 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings and finishes are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to paint finishes with matching touchup coating recommended by manufacturer.

- 3.4** Complete pathway installation before starting conductor installation.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification for conductors.
 - 3. Equipment identification labels.
 - 4. Miscellaneous identification products.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with NFPA 70E.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with OSHA requirements for electrical labeling.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, 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.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

2.1 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.

2.2 EQUIPMENT IDENTIFICATION LABELS

- A. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed.
 - 1. Equipment Label Text Height: Equipment name 3/16 inch; all other text 1/8 inch.
 - 2. Equipment Label Minimum Size: 2 inch by 4 inch.
 - 3. Equipment Label shall identify equipment name, equipment ampere and voltage ratings, and circuit feeding equipment.
 - 4. Labels for equipment shall be white letters on black background.
- B. Stenciled Legend: In nonfading, waterproof black ink.

2.3 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.
- B. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.

2.4 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws, or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
 - 1. In Spaces Handling Environmental Air: Plenum rated.

3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Metal-Clad Cables, 1000 V or Less, for Circuits More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.
 - 1. Locate identification at changes in direction, at penetrations of walls, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.

- B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in pull and junction boxes use color-coding conductor tape to identify the phase.
 - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. 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.
 - 2. Color for Neutral: White.
 - 3. Color for Equipment Ground: Green.
- C. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- D. 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. Systems include power, lighting, control, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:
 - a. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - b. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
 - 2. Equipment to Be Labeled:
 - a. Panelboards: Revise typewritten directory of circuits.
 - b. Enclosed switches.
 - c. Enclosed controllers.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Indoor occupancy and vacancy sensors.
 - 2. Switchbox-mounted occupancy sensors.
 - 3. Low-voltage lighting control.

1.3 SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of lighting control device to include in operation and maintenance manuals.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 INDOOR OCCUPANCY AND VACANCY SENSORS

- A. Refer to product information on the drawings.

2.2 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

- A. Refer to product information on drawings.

SECTION 260923 – LIGHTING CONTROL DEVICES

2.3 LOW-VOLTAGE LIGHTING CONTROL

- A. Low-voltage lighting control devices shall be compatible with the lighting system being controlled.
- B. Refer to product information on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.
- B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF SENSORS

- A. Comply with NECA 1.
- B. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- C. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.3 INSTALLATION OF WIRING

- A. Comply with NECA 1.
- B. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors in accordance with conductor manufacturer's written instructions.
- D. Size conductors in accordance with lighting control device manufacturer's written instructions unless otherwise indicated.
- E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

- A. Identify components and power and control wiring in accordance with Section 260553 "Identification for Electrical Systems."

SECTION 260923 – LIGHTING CONTROL DEVICES

3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Operational Test: After installing low-voltage controls, sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Lighting control devices will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.6 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
 - 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.

3.7 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Snap switches.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following. (Shortened versions shown in parentheses of the following manufacturers' names are used in other Part 2 articles):
1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 3. Leviton Mfg. Company Inc. (Leviton).
 4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498. Receptacles shall be heavy duty industrial grade type with one piece brass strap with internal ground.
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. Cooper; 5362, (Duplex).
 - b. Hubbell; HBL5362, (Duplex).
 - c. Leviton; 5362, (Duplex).
 - d. Pass & Seymour; 5362A, (Duplex).

2.3 GFCI RECEPTACLES

- A. General Description: Straight blade non feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
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. Cooper; XGF20.
 - b. Hubbell; GF5362.
 - c. Leviton: 7599.
 - d. Pass & Seymour: 2094.

2.4 SNAP SWITCHES

- A. Comply with NEMA WD1 and UL 20. Switches shall be heavy duty industrial grade with silver cadmium oxide contacts and rated 1 HP at 120v, and 2 HP at 277v.
- B. Switches: 120/277 V, 20 A:

SECTION 262726 - WIRING DEVICES

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. Cooper 2221 (single pole), 2223 (three way).
 - b. Hubbell HBL 1221 (single pole), HBL 1223 (three way).
 - c. Leviton: 1221-2 (single pole), 1223-2 (three way).
 - d. Pass & Seymour: PS20AC1 (single pole), PS20AC3 (three way).

2.5 LIGHTING CONTROL DEVICES

- A. Lighting control devices and associated components as indicated on drawings.

2.6 OCCUPANCY SENSORS

- A. Wall-Switch and Ceiling Sensors as indicated on drawings.

2.7 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
 1. Plate-Securing Screws: Metal with head color to match plate finish.
 2. Material for Finished Spaces: Brushed stainless steel – 304 stainless steel.
 3. Material for Unfinished Spaces: Galvanized steel.
 4. Material for Damp Locations: Brushed stainless steel with spring-loaded lift cover and listed and labeled for use in "wet locations."
- B. Wet-Location, Weatherproof In-Use Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum with lockable cover, and listed and labeled weather tight while-in-use.

2.8 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
 1. Wiring Devices Connected to Normal Power System: Ivory, unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
 1. Take steps to ensure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.

3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

D. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. Tighten unused terminal screws on the device.
8. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.
9. Receptacles located within 6 feet of a water source or exterior shall be GFCI type.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. 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.

G. 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.

3.2 IDENTIFICATION

A. Comply with Division 26 Section "Identification for Electrical Systems."

1. Receptacles: Identify panelboard and circuit number from which served. Use durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 - 1. Test Instruments: Use instruments that comply with UL 1436.
 - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.
- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. The 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.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Cartridge fuses rated 600-V ac and less for use in enclosed switches.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:
 - 1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.
 - a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
 - b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.
 - 2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
 - 3. Current-limitation curves for fuses with current-limiting characteristics.
 - 4. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.
 - 5. Coordination charts and tables and related data.
- B. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals include the following:
 - 1. Ambient temperature adjustment information.
 - 2. Current-limitation curves for fuses with current-limiting characteristics.
 - 3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.
 - 4. Coordination charts and tables and related data.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

1.5 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.6 COORDINATION

A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

PART 2 PRODUCTS

2.1 MANUFACTURERS

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

1. Cooper Bussmann, Inc.
2. Edison Fuse, Inc.
3. Mersen.
4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

1. All fuses shall be current limiting with 200,000 amperes interrupting capacity, and shall be certified by Underwriter's Laboratories, to have interrupting capacities adequate and proper for the system in which they are placed.
2. Type RK-1: 250 or 600 V, zero-to-600 A rated, time delay.
3. Type RK-5: 250 or 600 V, zero-to-600 A rated, time delay.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

- B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
- C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

- A. Cartridge Fuses:
 - 1. Motor Branch Circuits: Class RK5, time delay.
 - 2. Other Branch Circuits: Class RK1, time delay.

3.3 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
- B. No fuses shall be installed in the equipment until the installation is complete, including thorough cleaning, tightening of all electrical connections and inspection of all ground and grounding conductors. Fuses shall not be shipped installed in equipment and shall not be shipped to job site until equipment and systems are ready to be energized.
- C. A fuse identification label showing the fuse size and type shall be placed inside the door of each fused switch.
- D. Provide fuse reducers where fuse clips are spaced larger than the fuse size required.

3.4 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Division 26 Section "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

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Enclosures.

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.

1.4 SUBMITTALS

- A. Product Data: For each type of enclosed switch, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
 - 4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
 - 5. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.
- B. Shop Drawings: For enclosed switches. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Field quality-control reports.
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- D. Operation and Maintenance Data: For enclosed switches to include in emergency, operation, and maintenance manuals. Include the following:
 - 1. Manufacturer's written instructions for testing and adjusting enclosed switches.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain enclosed switches overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. 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.
- D. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
 - 2. Altitude: Not exceeding 6600 feet.

1.7 COORDINATION

- A. Coordinate layout and installation of switches, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 PRODUCTS

2.1 FUSIBLE SWITCHES

- 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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 240 and 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
5. Hookstick Handle: Allows use of a hookstick to operate the handle.
6. Lugs: Compression type, suitable for number, size, and conductor material.

2.2 NONFUSIBLE SWITCHES

- 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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 240 and 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 3. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
 4. Hookstick Handle: Allows use of a hookstick to operate the handle.
 5. Lugs: Compression type, suitable for number, size, and conductor material.

2.3 ENCLOSURES

- A. Enclosed Switches: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 2. Outdoor Locations: NEMA 250, Type 3R.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install individual wall-mounted switches with tops at uniform height unless otherwise indicated.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Install fuses in fusible devices and leave in the "off" position after final installation and testing.
- D. Switches shall be properly rated for the voltage of the system to which they are connected and shall have ampacity and horsepower rating corresponding to the load served.
- E. Install overcurrent protective devices and controllers not already factory installed.
- F. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems".
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

- A. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- B. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Enclosed switches will be considered defective if they do not pass tests and inspections.

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes the following enclosed controllers rated 600 V and less:

- 1. Full-voltage manual.

1.3 DEFINITIONS

- A. MCP: Motor circuit protector.
- B. N.C.: Normally closed.
- C. N.O.: Normally open.
- D. OCPD: Overcurrent protective device.

1.4 SUBMITTALS

- A. Product Data: For each type of enclosed controller. Include manufacturer's technical data on features, performance, electrical characteristics, ratings, and enclosure types and finishes.
- B. Shop Drawings: For each enclosed controller. Include dimensioned plans, elevations, sections, details, and required clearances and service spaces around controller enclosures.
 - 1. Show tabulations of the following:
 - a. Each installed unit's type and details.
 - b. Factory-installed devices.
 - c. Nameplate legends.
 - d. Short-circuit current rating of integrated unit.
 - e. Listed and labeled for integrated short-circuit current (withstand) rating of OCPDs in combination controllers by an NRTL acceptable to authorities having jurisdiction.
 - f. Features, characteristics, ratings, and factory settings of individual OCPDs in combination controllers.
 - 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Field quality-control reports.
- D. Operation and Maintenance Data: For enclosed controllers to include in emergency, operation, and maintenance manuals. Include the following:

1. Routine maintenance requirements for enclosed controllers and installed components.
 2. Manufacturer's written instructions for setting field-adjustable overload relays.
- E. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store enclosed controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.
- B. If stored in areas subject to weather, cover enclosed controllers to protect them from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
 2. Altitude: Not exceeding 6600 feet.

1.8 COORDINATION

- A. Coordinate layout and installation of enclosed controllers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate installation of equipment supports.

PART 2 PRODUCTS

2.1 FULL-VOLTAGE CONTROLLERS

- A. General Requirements for Full-Voltage Controllers: Comply with NEMA ICS 2, general purpose, Class A.
- B. Fractional Horsepower Manual Controllers: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped.

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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - b. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - c. Siemens Energy & Automation, Inc.
 - d. Square D; a brand of Schneider Electric.
2. Configuration: Nonreversing.
3. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 20 tripping characteristics; heaters matched to nameplate full-load current of actual protected motor; external reset push button; bimetallic type.
4. Flush or surface mounting as indicated.
5. Green run pilot light.
6. Controller shall be inoperative if overload element is removed.

2.2 ENCLOSURES

- A. Enclosed Controllers: NEMA ICS 6, to comply with environmental conditions at installed location.
 1. Dry and Clean Indoor Locations: Type 1.
 2. Outdoor Locations: Type 3R.

2.3 ACCESSORIES

- A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.
 1. Push Buttons and Pilot Lights: Heavy-duty, oiltight type.
 - a. Push Buttons: Recessed, Shrouded types; momentary as indicated.
 - b. Pilot Lights: LED types; colors as indicated; push to test.
- B. Cover gaskets for Type 1 enclosures.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas and surfaces to receive enclosed controllers, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine enclosed controllers before installation. Reject enclosed controllers that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Wall-Mounted Controllers: Install enclosed controllers on walls with tops at uniform height unless otherwise indicated, and by bolting units to wall or mounting on lightweight

structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Division 26 Section "Hangers and Supports for Electrical Systems".

- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Install heaters in thermal overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.
- D. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
- E. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Identify enclosed controllers, components, and control wiring. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems".
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved nameplate.
 - 3. Label each enclosure-mounted control and pilot device.

3.4 FIELD QUALITY CONTROL

- A. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed controller, component, connecting supply circuit.
 - 2. Test continuity of each circuit.
- B. Tests and Inspections:
 - 1. Inspect controllers, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
 - 2. Test insulation resistance for each enclosed-controller element, component, connecting motor supply circuits.
 - 3. Test continuity of each circuit.
 - 4. Verify that voltages at controller locations are within plus or minus 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Architect before starting the motor(s).
 - 5. Test each motor for proper phase rotation.
 - 6. Perform each electrical test and visual and mechanical inspection stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 8. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Enclosed controllers will be considered defective if they do not pass tests and inspections.

- D. Prepare test and inspection reports including a certified report that identifies enclosed controllers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.

3.6 PROTECTION

- A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until enclosed controllers are ready to be energized and placed into service.
- B. Replace controllers whose interiors have been exposed to water or other liquids prior to Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes the following types of LED luminaires:

- 1. LED Luminaires.
- 2. Internal emergency power units.
- 3. Materials.
- 4. Finishes.
- 5. Luminaire support.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. LED: Light-emitting diode.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Arrange in order of luminaire designation.
 - 2. Include data on features, accessories, and finishes.
 - 3. Include physical description and dimensions of luminaires.
 - 4. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
 - 5. Photometric data and adjustment factors based on laboratory tests.
 - a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Provide luminaires from a single manufacturer for each luminaire type.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.8 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- B. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form 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.
 - 1. Warranty Period for Emergency Lighting Unit Batteries: Five years from date of Substantial Completion.

PART 2 PRODUCTS**2.1 LUMINAIRE REQUIREMENTS**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Standards:
 - 1. ENERGY STAR certified.
 - 2. Recessed luminaires shall comply with NEMA LE 4.
- C. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- D. Internal driver.
- E. Nominal Operating Voltage: As indicated.
 - 1. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
- F. Internal Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body.

1. Emergency Connection: Operate lamp(s) continuously upon loss of normal power. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire ballast.
2. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
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: 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.

2.2 MANUFACTURERS

- A. In Lighting Fixture Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selections:
 1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.3 MATERIALS

- A. Metal Parts:
 1. Free of burrs and sharp corners and edges.
 2. Sheet metal components shall be steel unless otherwise indicated.
 3. Form and support to prevent warping and sagging.
- B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- C. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

2.4 METAL FINISHES

- A. Variations in finishes are unacceptable in the same piece.

2.5 LUMINAIRE SUPPORT

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems".

- B. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and relamping.
 - 3. Provide support for luminaire without causing deflection of ceiling.
 - 4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.
- D. Ceiling-Grid-Mounted Luminaires:
 - 1. Secure to any required outlet box.
 - 2. Luminaire installed in or on lay-in ceiling system shall be supported independently of the ceiling system grid with No. 14 galvanized support wires at two opposite corners of the fixture from the building structural system.
 - 3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.
- E. Wall-Mounted Luminaire Support:
 - 1. Attached to structural members in wall.
 - 2. Do not attach luminaires directly to gypsum board.
- F. Suspended Luminaires:
 - 1. Ceiling Mount:
 - a. Aircraft Cables.
 - b. Cables: Where longer than 48 inches, brace to limit swinging.

SECTION 265119 - LED LIGHTING

- c. Continuous rows of luminaires: Provide tubing or stem for wiring at one point and cable support for suspension for each unit length of luminaire chassis, including one at each end.
 - d. Do not use ceiling grid as support for pendant luminaires. Connect support cable to building structure.
- G. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Exit signs.
 - 2. Internal emergency power units.
 - 3. Luminaire supports.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Lumen: Measured output of lamp and luminaire, or both.
- D. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 SUBMITTALS

- A. Product Data: For each type of emergency lighting unit and exit sign.
 - 1. Include data on features, accessories, and finishes.
 - 2. Include physical description of the unit and dimensions.
 - 3. Include life, output of luminaire (lumens, CCT, and CRI), and energy-efficiency data.
 - 4. Include photometric data and adjustment factors based on laboratory tests for each luminaire type.
 - a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Comply with NFPA 70.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.8 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- 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.
 - 1. Warranty Period for Self-Powered Exit Sign Batteries: Five years from date of Substantial Completion.

PART 2 PRODUCTS**2.1 GENERAL REQUIREMENTS FOR EMERGENCY LIGHTING**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Fabricate and label exit signs to comply with UL 924.
- C. Comply with NFPA 70 and NFPA 101.
- D. Internal Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body.
 - 1. Emergency Connection: Operate lamp(s) continuously upon loss of normal power. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire ballast.
 - 2. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - 3. Test Push-Button and Indicator Light: Visible and accessible without opening luminaire or entering ceiling space.
 - 4. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - 5. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - 6. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - 7. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.

2.2 MANUFACTURERS

- A. In Lighting Fixture Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selections:
 - 1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.3 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.
 - 1. Operating at nominal voltage of 120 V or 277 V ac as indicated.
 - 2. Lamps for AC Operation: LEDs; 50,000 hours minimum rated lamp life.
 - 3. Self-Powered Exit Sign (Battery Type): Internal Emergency Power Unit.

2.4 MATERIALS

- A. Metal Parts:
 - 1. Free of burrs and sharp corners and edges.
 - 2. Sheet metal components shall be steel unless otherwise indicated.
 - 3. Form and support to prevent warping and sagging.
- B. Doors, Frames, and Other Internal Access:
 - 1. Smooth operating, free of light leakage under operating conditions.
 - 2. Designed to permit relamping without use of tools.
 - 3. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

2.5 METAL FINISHES

- A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable.

2.6 LUMINAIRE SUPPORT COMPONENTS

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems".

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for conditions affecting performance of luminaires.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Examine walls and ceilings for suitable conditions where exit signs units will be installed.

- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Provide support for luminaire without causing deflection of ceiling.
 - 3. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.
- D. Ceiling Grid Mounted Luminaires:
 - 1. Secure to any required outlet box.
 - 2. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.
- E. Wall-Mounted Luminaire Support:
 - 1. Attached to structural members in walls.
 - 2. Do not attach luminaries directly to gypsum board.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Operational Test: After installing luminaries and after electrical circuitry has been energized, test units to confirm proper operation.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.

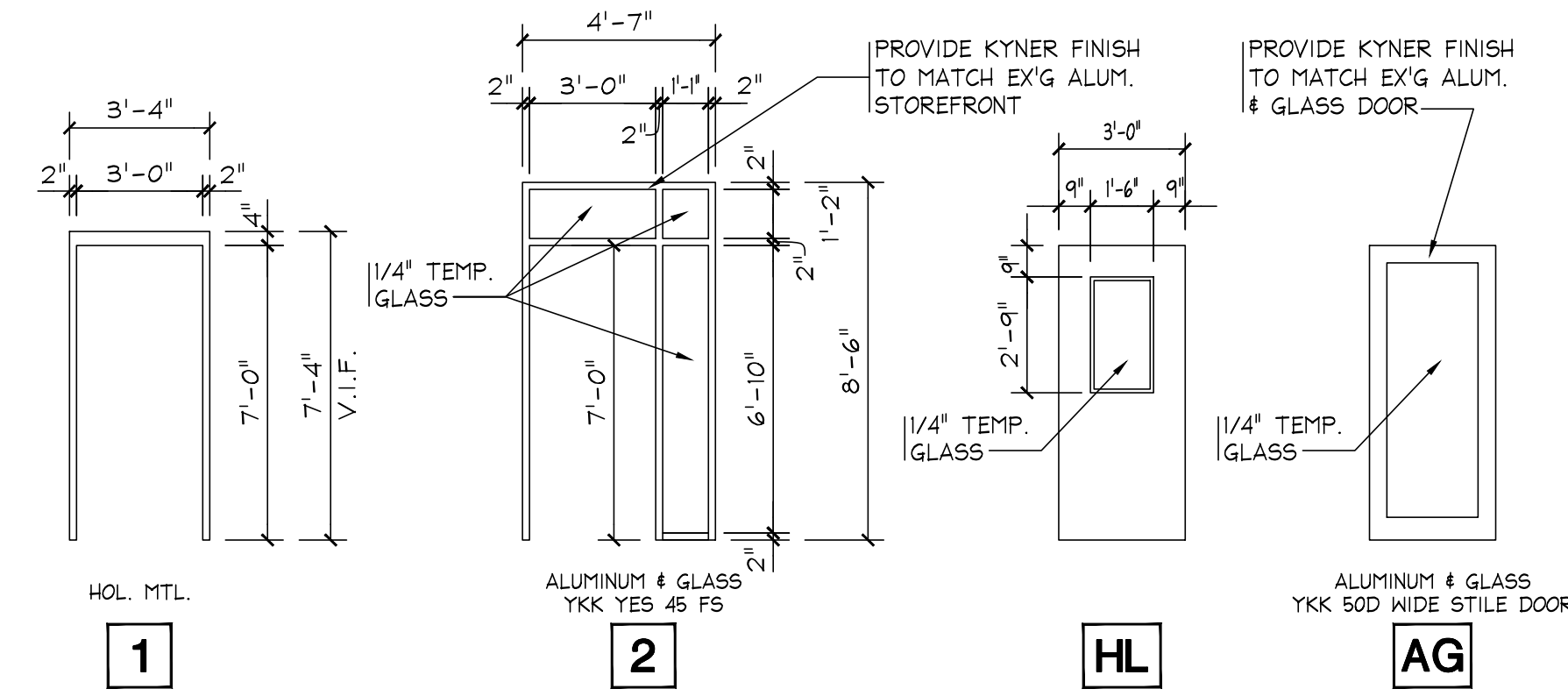
END OF SECTION

ROOM FINISH SCHEDULE

ROOM NAME	FLOOR	BASE	WALL	CLG.	HEIGHT	REMARKS
VESTIBULE	EXIST. CER. TILE	---	PTD. G.W.B./PTD. G.W.B.	EXISTING	EXISTING	
GENERAL OFFICE	CARPET TILE	VINYL	CER. TILE	ACoust. TILE	MATCH EX'G	
OFFICE #1	CARPET TILE	VINYL	PTD. G.W.B.	ACoust. TILE	9'-0"	
FILE ROOM	CARPET TILE	VINYL	PTD. G.W.B.	ACoust. TILE	10'-0"	
COPY ROOM	CARPET TILE	VINYL	PTD. G.W.B.	ACoust. TILE	MATCH EX'G	
BREAK ROOM	LVT	VINYL	PTD. G.W.B.	ACoust. TILE	8'-0"	
ALCOVE	CARPET TILE	VINYL	PTD. G.W.B.	ACoust. TILE	MATCH EX'G	

NOTES:

1. COORDINATE ALL FINISH SELECTIONS/LOCATIONS WITH OWNER..

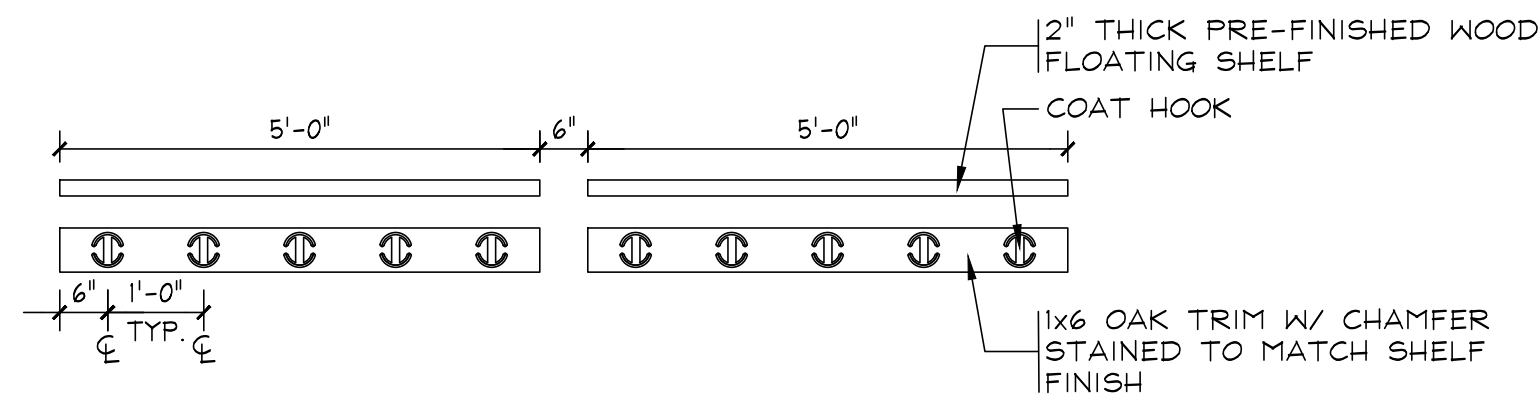


DOOR/FRAME TYPES

SCALE: 1/4" = 1'-0"

NOTES:

- DOOR #1 3'-0" x 7'-0" S.C. WOOD DOOR; PREFINISHED WITH HALF-LITE (3) HINGES #TA2714 US26D MCKINNEY (1) OFFICE LOCK #MP 4704/LN LESS CYLINDER 626 ASSA ABLOY ACCENTRA (1) CYLINDER AS REQUIRED 626 (1) FLOOR STOP #44ICU 630 ROCKWOOD (3) SILENCER # 608-RKN ROCKWOOD
- DOOR #2 3'-0" x 7'-0" WIDE STILE ALUMINUM AND GLASS DOOR, PREFINISHED KYNAR 500; YKK 50D (1) CONTINUOUS HINGE; PEMKO CFM95HDI; 628 (1) CONCEALED VERTICAL EXIT ROD EXIT DEVICE W/MOTORIZED LATCH RETRACTION: YKK MEL36912-36; 628 (1) SMART SERIES PANIC PULL-YKK H-1541; 1" DIA 9" CTC; 628 (1) STANDARL RIM CYLINDER: YKK H-4203; 628 (1) DOOR CLOSER: NORTAN 7500XSN; 689 (1) CLOSER DROP PLATE: NORTAN 7703; 689 (1) POKER SUPPLY: FIRST CHOICE PSMEL500-1 (1) POWER TRANSFER DOOR LOOP; SECURITRON TSB-C; 630 (1) THRESHOLD: YKK H-8000 SERIES; MILL (1) WEATHER STRIPPING PACKAGE: YKK; BLACK
- GC TO CONFIRM KEYING SYSTEM REQUIREMENTS WITH OWNER PRIOR TO ORDERING HARDWARE.

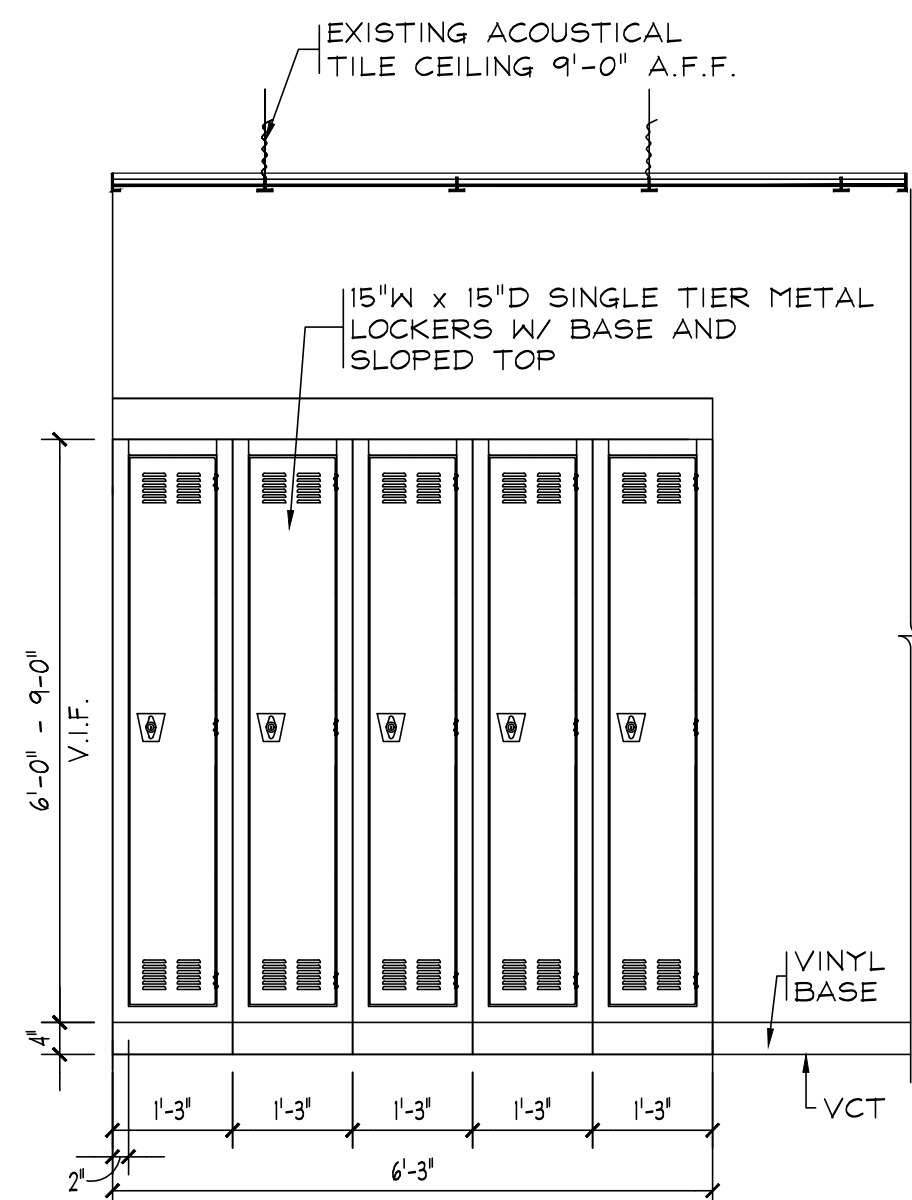


FLOATING SHELF / COAT HOOK DETAIL

SCALE: 1/2" = 1'-0"

NOTES:

- PREFINISHED FLOATING WOOD SHELVING TO BE MANUFACTURED BY WALLNITURE (#44,293,1858); BOIS 60" LONG FLOATING WALL SHELF WITH HIDDEN BRACKETS; 10" DEEP AND 2" THICK SOLID WOOD; OR APPROVED EQUAL; FINISH AS SELECTED BY ARCHITECT.
- COAT HOOKS TO BE MANUFACTURED BY HAFELE; LAGO DI COMO COLLECTION; MATTE ALUMINUM FINISH; MODEL NO. 843,65,900, OR APPROVED EQUAL.
- VERIFY MOUNTING HEIGHT AND FINAL LOCATION W/ OWNER.



LOCKER ELEVATION

SCALE: 1/2" = 1'-0"

NOTES:

- LOCKERS TO BE MANUFACTURED BY LIST INDUSTRIES; SUPERIOR LOCKERS HEAVY-DUTY CORRIDOR (HDC) SINGLE TIER; 15"W x 15"D x 72"H; PROVIDE CONTINUOUS AND SLOPE TOP AND 2-BASE. SEE SPECIFICATION SECTION 060010 - CARPENTRY FOR ADDITIONAL INFORMATION.

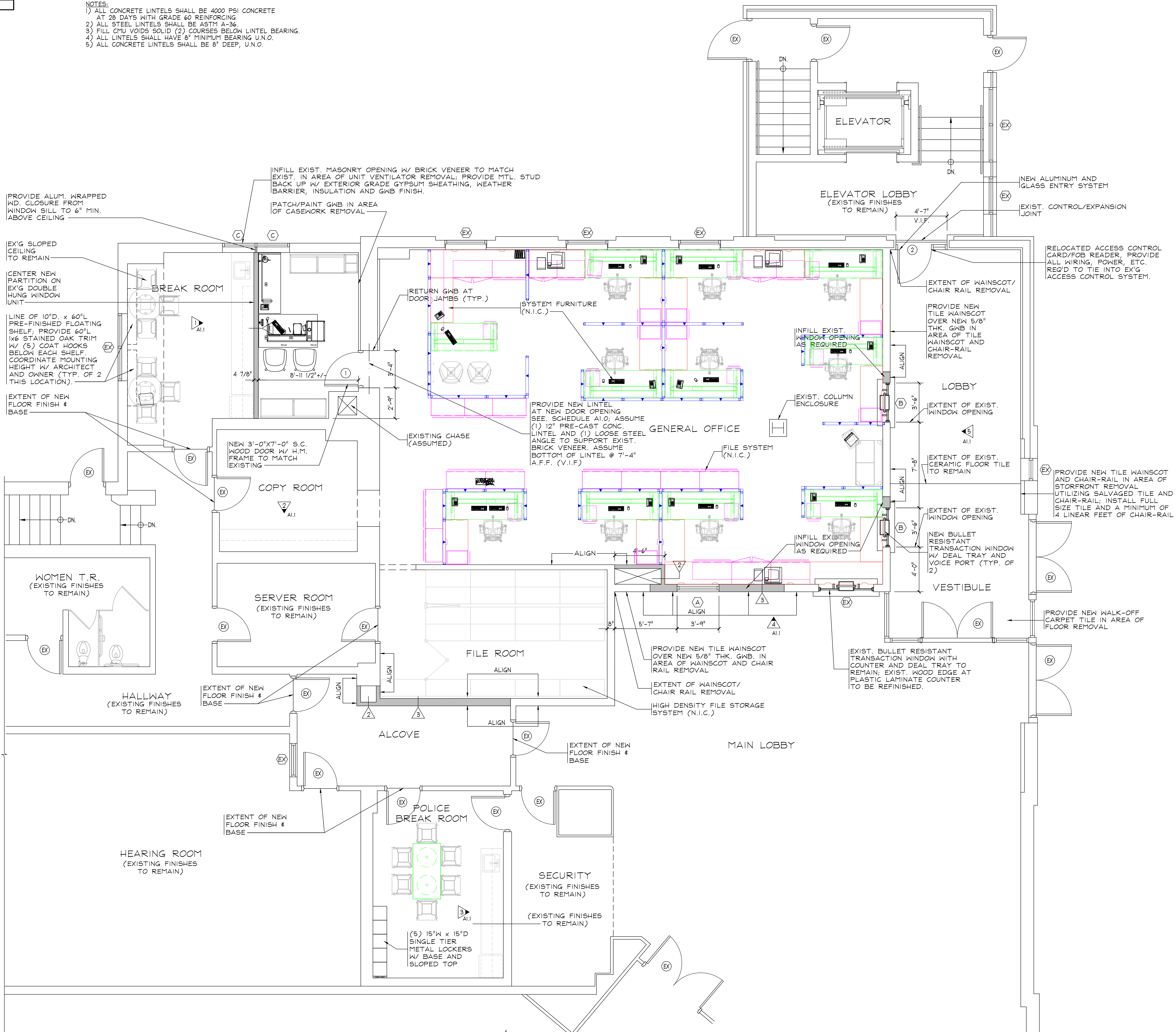
CONCRETE/STEEL LINTEL SCHEDULE

(NON-BEARING WALLS)

WIDTH OF OPENING	STEEL FOR EACH 4" OF WALL THICKNESS	REINF. CONC. FOR EACH 4" OF WALL THICKNESS	REMARKS
UP TO 2'-11"	43 1/2x3 1/2x5/16	(1) #4 TOP & BOTTOM	
3'-0" TO 3'-11"	44x3 1/2x5/16	(1) #4 TOP & BOTTOM	
4'-0" TO 5'-11"	45x3 1/2x5/16	(1) #4 TOP & BOTTOM	
6'-0" TO 8'-0"	46x3 1/2x5/16	(1) #5 TOP & BOTTOM	
8'-1" TO 10'-0"	46x3 1/2x3/8	(1) #5 TOP & BOTTOM	

NOTES:

- ALL CONCRETE LINTELS SHALL BE 4000 PSI CONCRETE AT 28 DAYS WITH GRADE 60 REINFORCING
- ALL STEEL LINTELS SHALL BE ASTM A-36
- FILL CMU VOIDS SOLID (2) COURSES BELOW LINTEL BEARING.
- ALL LINTELS SHALL HAVE 8" MINIMUM BEARING U.N.O.
- ALL CONCRETE LINTELS SHALL BE 8" DEEP, U.N.O.

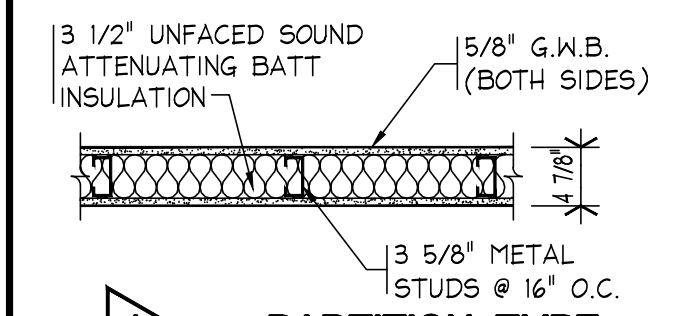


PARTIAL FIRST FLOOR PLAN

SCALE: 1/4" = 1'-0"

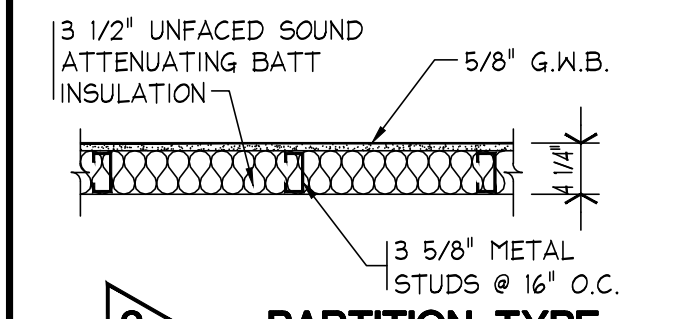
Revisions

No.	Date	Description

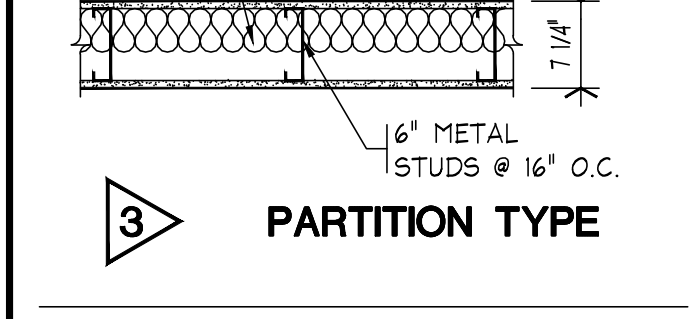


1 PARTITION TYPE

NOTE:
EXTEND PARTITION TO UNDERSIDE OF ROOF DECK ABOVE W/ G.W.B. ON EACH SIDE UNLESS NOTED OTHERWISE



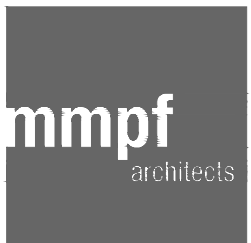
2 PARTITION TYPE



3 PARTITION TYPE

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Project

VINELAND MUNICIPAL COURT RENOVATIONS

736 E. LANDIS AVE.
VINELAND, NEW JERSEY 08310

Drawing

PROPOSED FLOOR PLAN,
SCHEDULE, DOOR/FRAME
TYPES, PARTITION
TYPES

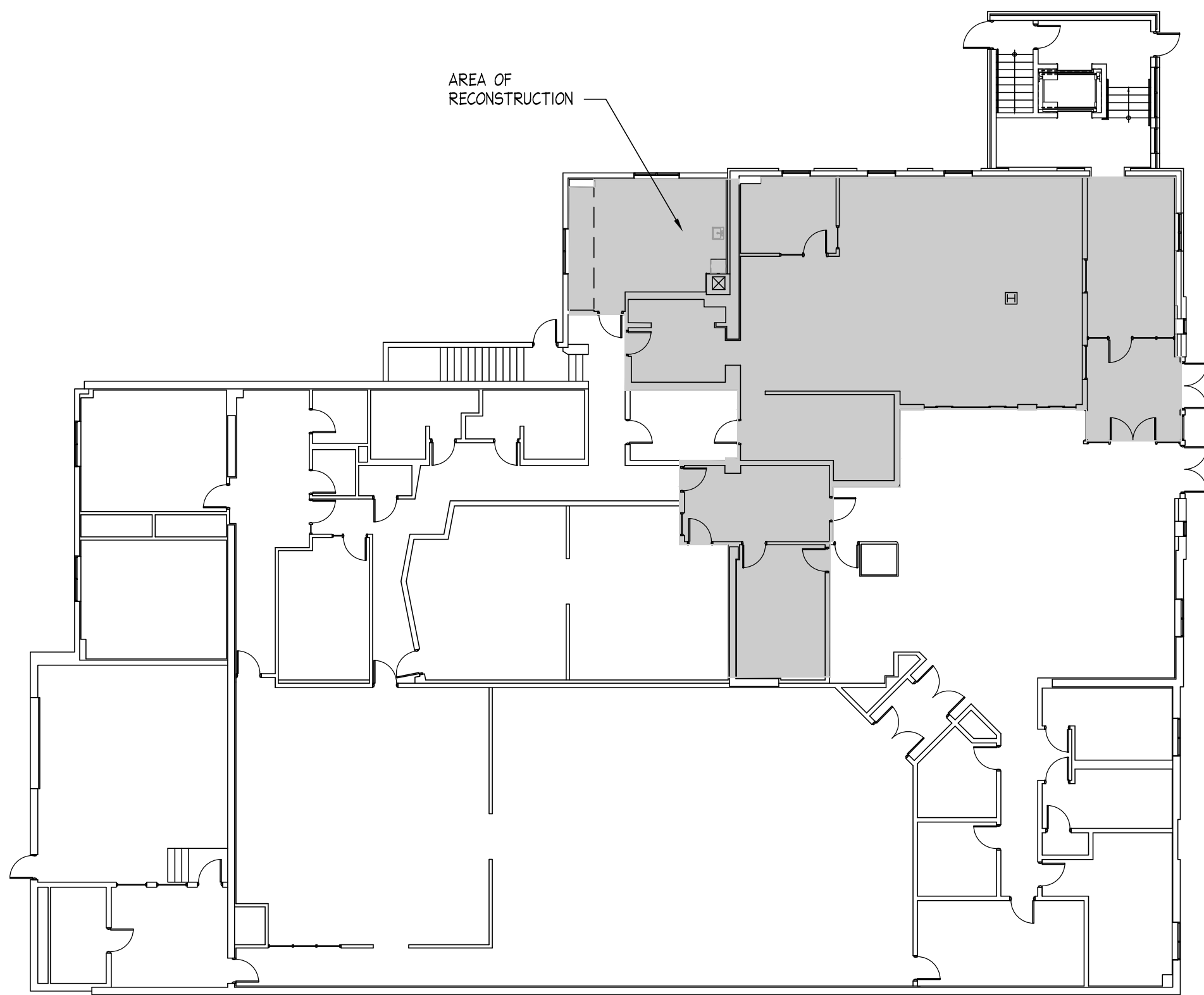
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VINELAND MUNICIPAL COURT RENOVATIONS

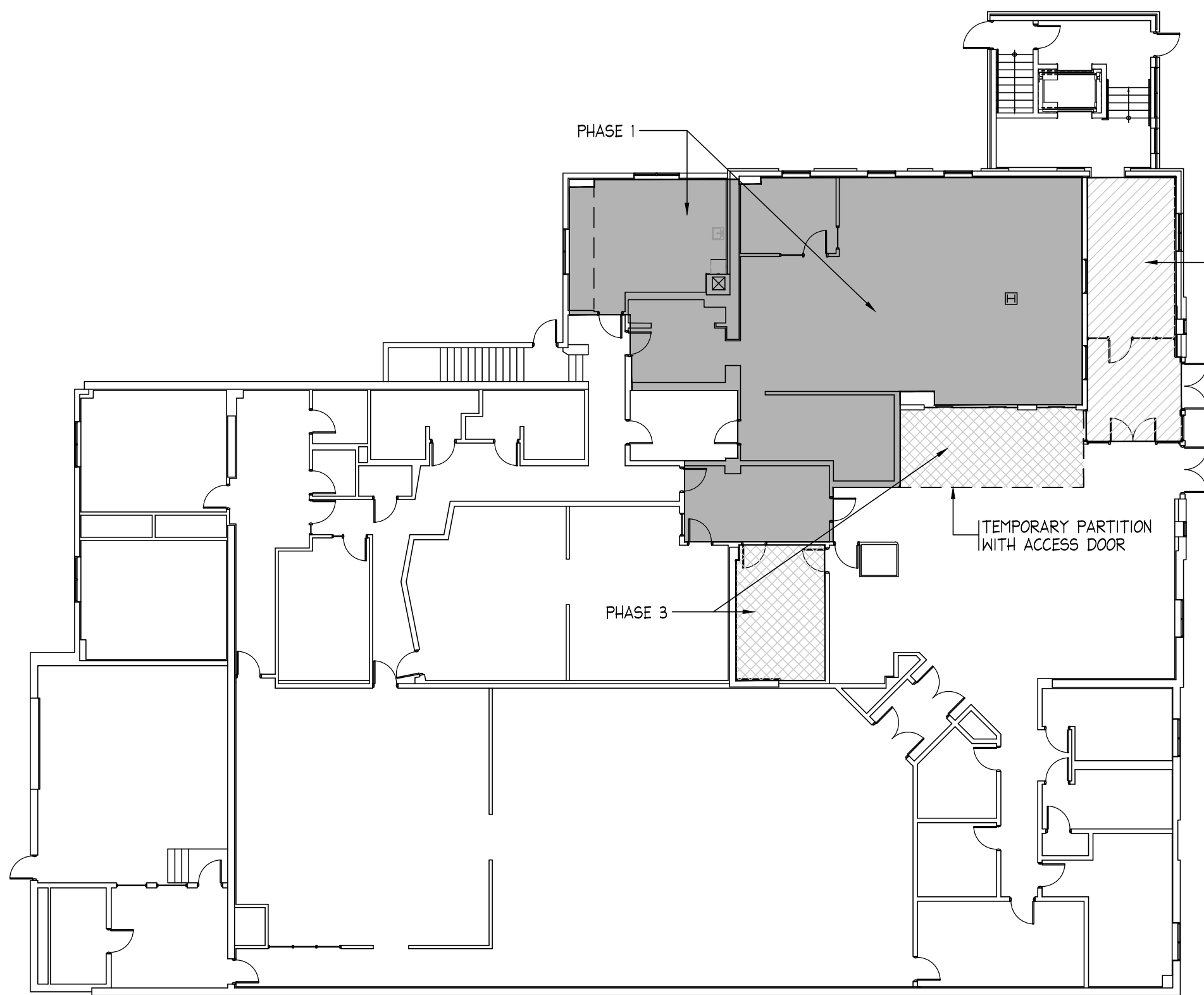
PROJECT ADDRESS: 736 EAST LANDIS AVE, VINELAND NEW JERSEY, 08360

MMPFA PROJECT #22.019



KEY PLAN

SCALE: 1/16" = 1'-0"



PHASING PLAN

SCALE: 1/16" = 1'-0"

1. REFER TO PROJECT MILESTONES IN SPECIFICATION SECTION 01000-SUMMARY OF WORK

PHASING NOTES:

- PHASE 1 INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING: ALL DEMOLITION AND NEW CONSTRUCTION REQUIRED IN THE GENERAL OFFICE, COPY ROOM, FILE ROOM, ALCOVE AND BREAK ROOM. WORK INCLUDES THE INSTALLATION OF THE NEW TRANSACTION WINDOWS, CASEWORK, FINISHES AND WORK TO THE MECHANICAL, PLUMBING AND ELECTRICAL SYSTEMS
- PHASE 2 INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING: ALL DEMOLITION AND NEW CONSTRUCTION REQUIRED IN THE EXISTING VESTIBULE AREA AND LOBBY, WORK INCLUDES THE REMOVAL OF THE INTERIOR ALUMINUM AND GLASS ENTRY SYSTEM, THE REMOVAL OF THE TILE MAINSCOT AND THE INSTALLATION OF THE NEW TILE MAINSCOT. PATCHING/PAINTING OF THE EXISTING AND NEW GMB IS ALSO INCLUDED.
- PHASE 3 INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING: THE REMOVAL OF THE EXISTING TILE MAINSCOT AND THE INSTALLATION OF THE NEW TILE MAINSCOT IN THE MAIN LOBBY AREA. PATCHING/PAINTING OF THE EXISTING AND NEW GMB IS ALSO INCLUDED. PHASE 3 ALSO INCLUDES THE INSTALLATION NEW CASEWORK AND SINK THE POLICE BREAK ROOM AND ANY PATCHING OF FINISHES REQUIRED.
- KEEP THE ENTIRE CONSTRUCTION SITE SEALED OFF FROM SURROUNDING AREAS. PROVIDE STEEL STUD WALLS WITH STUDS 16" O.C. WITH 4 MM THICK (MIN.) CORRUGATED COREX PROTECTION BOARD PANELS; FLOOR TO ROOF DECK OR CEILING/SOFFIT CONSTRUCTION ABOVE; ALL SEAMS MUST BE TAPED.
- PROVIDE TEMPORARY ACCESS DOORS WITH WEATHER STRIPPING.
- PROVIDE DUST WALK-OFF MATS AT BOTH SIDES OF ALL ENTRANCES UTILIZED FOR/DURING CONST.
- REMOVE BARRIER MATERIALS CAREFULLY TO MINIMIZE THE SPREADING OF DIRT AND DEBRIS ASSOCIATED WITH CONSTRUCTION ACTIVITIES.

DRAWING LIST			
SHEET NO.	SHEET NAME	ISSUED	
		DES.	DATE
GENERAL			
C1.0	KEY PLAN, PHASING PLAN, BUILDING DATA, DRAWING LIST AND NOTES		
ARCHITECTURAL			
D1.0	DEMOLITION PLAN, KEY NOTES		
A1.0	PROPOSED FLOOR PLAN, SCHEDULE, DOOR/FRAME TYPES, PARTITION TYPES		
A1.1	INTERIOR ELEVATIONS, DETAILS AND NOTES		
A1.2	REFLECTED CEILING PLAN		
MECHANICAL			
M0.1	HVAC LEGEND AND SCHEDULES	1	
M1.0	PARTIAL FIRST FLOOR HVAC PLAN	1	
M2.0	HVAC DETAILS	1	
PLUMBING			
P1.1	PLUMBING LEGEND, SCHEDULES AND DETAILS	1	
P1.0	PARTIAL FIRST FLOOR PLUMBING PLANS	1	
ELECTRICAL			
E1.0	FIRST FLOOR ELECTRICAL PLANS	1	
E2.0	PANEL SCHEDULES	1	
FIRE PROTECTION			
FP1.0	FIRST FLOOR FIRE PROTECTION PLAN	1	

GENERAL/DEMOLITION NOTES

- A. THE DEMOLITION DRAWINGS SHALL SERVE TO AID THE CONTRACTOR IN THE EVALUATION OF THE EXTENT OF REMOVALS, BUT SHALL NOT BE HELD TO BE ALL INCLUSIVE.
- B. CUT, PATCH & REPAIR ALL OPENINGS IN WALLS, FLOORS, CEILINGS, ETC. WHERE REQUIRED TO ACCOMMODATE NEW DESIGN. PATCHING SHALL MATCH EXISTING CONSTRUCTION & FINISHES REMAINING. COORDINATE ALL FINISHES WITH CONSTRUCTION DOCUMENTS. THIS INCLUDES LEVELING OF ALL FLOORS AND INFILLING OF ANY TRENCHED AREAS.
- C. DEMOLITION WORK SHALL INCLUDE REMOVAL OF ALL DESIGNATED ITEMS, INCLUDING BUT NOT LIMITED TO PARTITIONS, DOORS, WINDOWS, FURRING, HANGERS, UNUSED ATTACHMENTS, CEILING TILE & GRID, FLOOR FINISHES, ETC. WHERE DEMOLITION ACTIVITIES INVOLVE STRUCTURAL ELEMENTS, BEAMS, JOISTS, CMU BEARING WALLS ETC., DEMOLITION WORK SHALL BE CLOSELY COORDINATED WITH NEW CONSTRUCTION WORK. NO WORK SHALL COMMENCE WITHOUT ADEQUATE BRACING OR SHORING AS REQUIRED TO PREVENT MOVEMENT OR SETTLING IN THE EXISTING STRUCTURE. REMOVALS OF A STRUCTURAL NATURE; BEARING WALLS, ROOFS, FOOTINGS ETC., SHALL BE MADE ONLY UNDER DIRECT SUPERVISION OF QUALIFIED PERSONNEL AND SHALL BE SECURED OR OTHERWISE BRACED WHERE EVER FEASIBLE, BY INCORPORATION INTO PROPOSED NEW WORK INCLUDING BUT NOT LIMITED TO INSTALLATION OF NEW LINTELS, NEW INFILL OF CONCRETE BLOCK TO FORM NEW OPENINGS, AND NEW STEEL AT ROOF STRUCTURE AND OPENINGS, AS MUCH AS POSSIBLE NEW CONSTRUCTION IN KEEPING WITH THE PROPOSED CONDITIONS SHALL BE INSTALLED IN LIEU OF TEMPORARY BRACING.
- D. PRIOR TO COMMENCEMENT OF ANY DEMOLITION WORK, THE CONTRACTOR SHALL MEET WITH THE OWNER TO DETERMINE WHICH ITEMS, IF ANY, ARE OF SALVAGEABLE VALUE TO THE OWNER. THE CONTRACTOR IS ENCOURAGED TO ALSO DOCUMENT ANY EXISTING DAMAGE OR DEFICIENCIES, IN BOTH WRITTEN AND PHOTOGRAPHIC FORMS AS REQUIRED, WHICH ARE EVIDENT IN THE EXISTING BUILDING.
- E. ALL ITEMS DESIGNATED TO BE OF SALVAGEABLE VALUE TO THE OWNER SHALL BE REMOVED AS DIRECTED BY THE OWNER. ALL ITEMS DESIGNATED FOR DEMOLITION SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED COMPLETELY FROM THE SITE AND DISPOSED OF AS NECESSARY, IN ACCORDANCE WITH ALL REGULATIONS IN EFFECT.
- F. CONFORM TO APPLICABLE CODES FOR DEMOLITION WORK, SAFETY OF STRUCTURE AND DUST CONTROL. NOTIFY AFFECTED UTILITY COMPANIES BEFORE STARTING WORK AND COMPLY WITH THEIR REQUIREMENTS. DO NOT CLOSE OR OBSTRUCT EGRESS TO EXIST. DO NOT DISRUPT BUILDING, FIRE, OR LIFE SAFETY SYSTEMS WITHOUT (3) DAYS PRIOR WRITTEN NOTICE TO THE OWNER.
- G. MAINTAIN TEMPORARY PARTITIONS TO PREVENT THE SPREAD OF DUST, ODORS, AND NOISE, AND TO PERMIT CONTINUED OWNER OCCUPANCY. PROTECT EXISTING MATERIALS WHICH ARE NOT TO BE DEMOLISHED.
- H. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS, APPROVALS, TESTING AND INSPECTIONS AS MAY BE REQUIRED BY THE AUTHORITY HAVING JURISDICTION (AHJ). CONTRACTOR SHALL OBTAIN AND PAY FOR ALL REQUIRED DEPARTMENT OF BUILDINGS PERMITS PRIOR TO THE START OF WORK. ALL PERMITS ISSUED BY THE AUTHORITY HAVING JURISDICTION (AHJ) SHALL BE POSTED IN A CONSPICUOUS PLACE OPEN TO PUBLIC INSPECTION FOR THE ENTIRE TIME OF THE EXECUTION OF THE WORK OF THE USE AND OPERATION OF THE EQUIPMENT OR UNTIL THE EXPIRATION OF THE PERMIT.
- I. MEANS OF EGRESS SHALL BE KEPT UNOBSTRUCTED AT ALL TIMES.
- J. WRITTEN DIMENSIONS ON THESE DRAWINGS SHALL HAVE PRECEDENCE OVER SCALED DIMENSIONS. CONTRACTORS SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS ON THE JOB AND NOTIFY ARCHITECTS OFFICE OF ANY VARIATIONS FROM THE DIMENSIONS AND CONDITIONS SHOWN BY THESE DOCUMENTS. ALL CONSTRUCTION, DIMENSIONS AND DETAILS SHALL CONCUR WITH AND BE DETERMINED FROM THESE DOCUMENTS ONLY.
- K. ALL CONTRACTORS SHALL BE RESPONSIBLE FOR ADEQUATELY BRACING AND PROTECTING ALL WORK DURING CONSTRUCTION AGAINST DAMAGE, BREAKAGE, COLLAPSE, DISTORTIONS AND OFF ALIGNMENT.
- L. EXISTING CONDITIONS/CONSTRUCTION DAMAGED OR REMOVED AS A RESULT OF WORK REQUIRED TO BE COMPLETED UNDER THIS CONTRACT SHALL BE REPAIRED OR REPLACED TO ORIGINAL CONDITION AND FINISHED TO MATCH ADJACENT FINISHES BY THE CONTRACTOR AT NO COST TO THE OWNER.
- M. FILL ALL HOLES AND VOIDS IN FLOORS, WALLS, CEILINGS, ETC. WHICH RESULT FROM INSTALLATION OF NEW WORK AND REMOVAL OF EXISTING MATERIALS AND EQUIPMENT REQUIRED BY CONTRACT. PATCHED AREAS SHALL BE MADE FLUSH, FILLED WITH APPROPRIATE MATERIAL, SANDED SMOOTH & REFINISHED OR PAINTED AS APPROPRIATE TO MATCH MATERIALS, FINISHES AND LEVELS ADJACENT.
- N. CONTRACTOR SHALL VERIFY SIZE AND QUANTITY TAKEOFFS OF OWNER FURNISHED EQUIPMENT AND BE RESPONSIBLE FOR COORDINATING ROUGH-INS AND CONNECTIONS FOR SAME.
- O. ALL PROPOSED WORK SHALL INCLUDE ALL THE MATERIAL AND LABOR NECESSARY TO COMPLETE DEMOLITION AND CONSTRUCTION AS SHOWN ON THESE DRAWINGS.
- P. ALL CONTRACTORS AND SUBCONTRACTORS SHALL BE RESPONSIBLE FOR THE PROPER PERFORMANCE OF THEIR WORK, COORDINATION WITH OTHER TRADES, METHODS, SAFETY AND SECURITY ON THE JOB SITE. THE ARCHITECT AND HIS AGENT ARE NOT RESPONSIBLE OR LIABLE FOR THE ABOVE AND SHALL BE HELD HARMLESS AND INDEMNIFIED BY ALL CONTRACTORS FROM ANY CLAIMS, LOSSES, SUITS, OR LEGAL ACTIONS ARISING FROM THE PERFORMANCE OF WORK ON THIS PROJECT.
- Q. BEFORE START OF CONSTRUCTION, CONTRACTOR TO OBTAIN APPROVAL FROM BUILDING REPRESENTATIVES. ANY CONSTRUCTION INVOLVING INTERRUPTION OF BUILDING SERVICES MUST BE APPROVED AND COORDINATED WITH THE BUILDING REPRESENTATIVES BEFORE COMMENCEMENT OF WORK.
- R. ALL MATERIALS TO BE USED IN CONSTRUCTION SHALL BE NEW AND SHALL BE SUPPLIED AND INSTALLED AS PER MANUFACTURER'S SPECIFICATIONS. CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO THE FABRICATION OF ANY AND ALL ITEMS.
- S. CONTRACTOR SHALL THOROUGHLY INSPECT PREMISES NOTING ALL AREAS OF WORK AND SHALL PRODUCE A NEAT ACCEPTABLE JOB. WHERE PARTIAL REMOVAL OR PATCH OCCURS, ENTIRE SURFACE SHALL BE REFINISHED WITH QUALITY WORKMANSHIP.
- T. REMOVE AND LEGALLY DISPOSE OF ALL TRASH AND DEBRIS FROM THE SITE. NO ACCUMULATION OF TRASH OR DEBRIS SHALL BE PERMITTED.
- U. INSTALL ALL OWNER FURNISHED EQUIPMENT. THE GENERAL CONTRACTOR SHALL COORDINATE THE TRADE(S) CLAIMING THE WORK. UNLESS NOTED OTHERWISE THE INSTALLATION SHALL BE INCLUDED AS PART OF THE WORK OF THIS CONTRACT.
- V. CLOSE AND SEAL ALL OPENINGS IN WALLS, FLOORS, CEILINGS, ETC. REQUIRED BY CUTTING FOR NEW WORK TO MATCH EXISTING FINISHES AND FIRE RATING. FIRE SEAL AROUND ALL PIPES, DUCTS, CONDUITS, ETC. WHERE REQUIRED BY CODE.

Revisions

No.	Date	Description

BUILDING DATA

ALL CONSTRUCTION TO COMPLY WITH THE FOLLOWING:

STATE OF NEW JERSEY REHABILITATION SUB CODE 5-23-6; RECONSTRUCTION 2021 INTERNATIONAL BUILDING CODE - NEW JERSEY EDITION AS REFERENCED BY THE REHABILITATION SUB CODE

BARRIER FREE SUBCODE - ICC/ANSI 117.1-2017

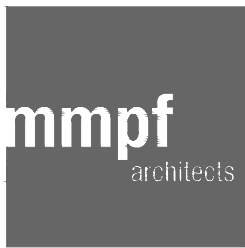
CONSTRUCTION CLASSIFICATION: 3B
AREA OF RECONSTRUCTION: 2,994 SF
NON-SEPARATED: 5-1 AND A-3
CURRENT USE GROUP: MIXED USE NON-SEPARATED 5-1 AND A-3
PROPOSED USE GROUP: MIXED USE NON-SEPARATED 5-1 AND A-3

NOTES:

- BUILDING IS EQUIPPED THROUGHOUT WITH AN AUTOMATIC FIRE SUPPRESSION SYSTEM.
- PROPOSED RENOVATIONS DO NOT IMPACT OCCUPANCY, TRAVEL DISTANCE OR EGRESS REQUIREMENTS

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A1-19038
A1-19618

Project

VINELAND MUNICIPAL COURT RENOVATIONS

736 E. LANDIS AVE
VINELAND, NEW JERSEY 08310

Drawing

KEY PLAN, PHASING PLAN, BUILDING DATA, DRAWING LIST AND NOTES

Scale

AS NOTED

Job

22.019

Sheet

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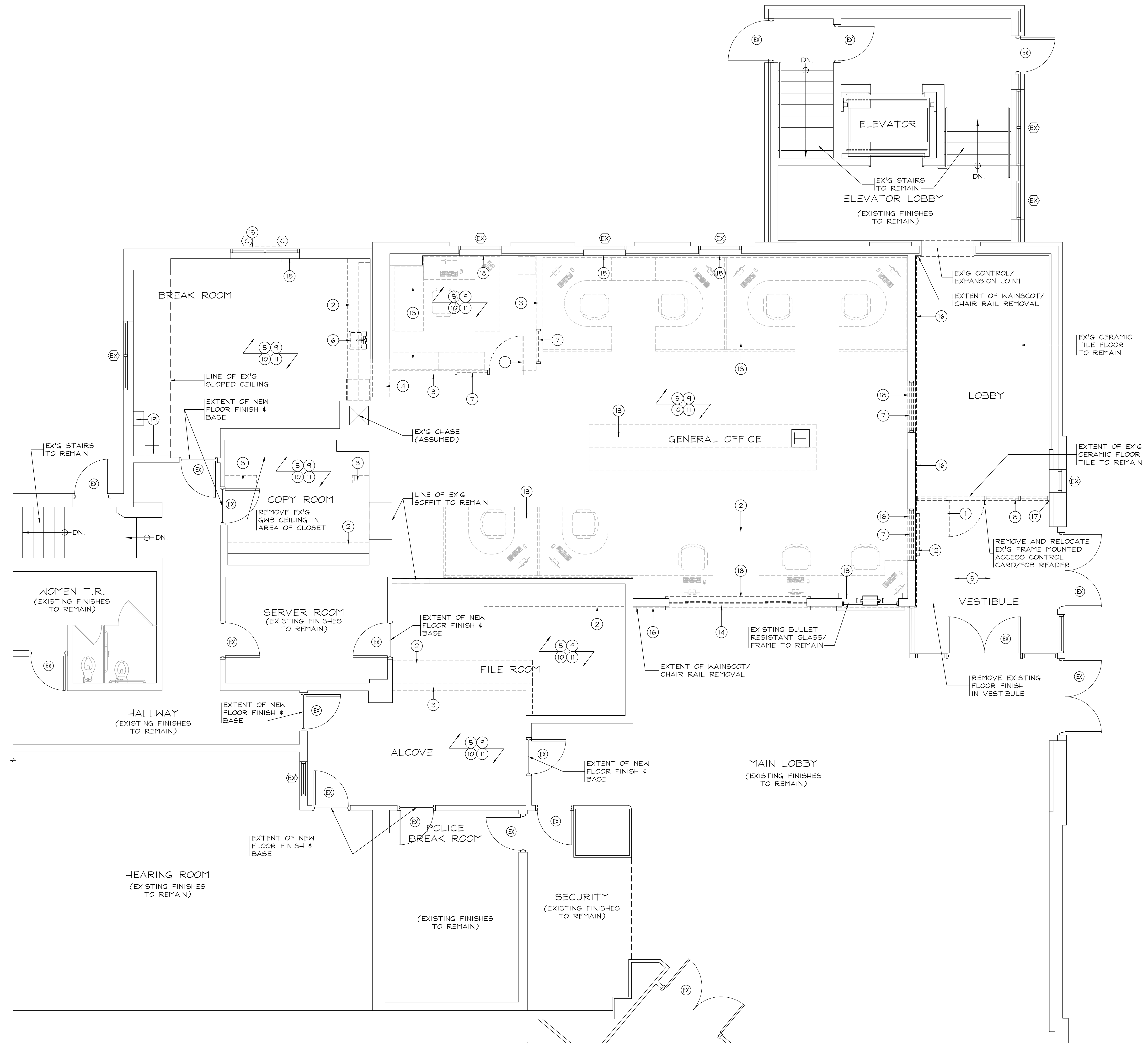
Date

08/01/25

1 of 5

- ① REMOVE EXISTING DOOR, FRAME AND ALL ASSOCIATED HARDWARE/CONSTRUCTION AS REQUIRED TO ACCOMMODATE NEW CONSTRUCTION. PATCH AND REPAIR ANY EXISTING CONSTRUCTION DAMAGED BY REMOVAL.
- ② REMOVE EXISTING CASEWORK/SHELVING IN THIS AREA COMPLETELY; PATCH ALL AREAS AFFECTED BY REMOVAL AS REQUIRED FOR NEW CONSTRUCTION.
- ③ REMOVE EXISTING WALL CONSTRUCTION COMPLETELY/PARTIALLY, AND AS REQUIRED TO ACCOMMODATE NEW CONSTRUCTION. UTILITY CONNECTIONS, CONDUIT AND PIPING SHALL BE REMOVED COMPLETELY WHERE NOT SCHEDULED FOR INCORPORATION INTO NEW WORK OR, IF NOT PERMITTED TO BE REMOVED, SHALL BE PROTECTED IN PLACED SURFACE MOUNTED ITEMS SHALL BE REMOVED. SEE MEP DWGS FOR ADDITIONAL INFORMATION.
- ④ REMOVE WALL/PARTITION OR PORTION OF THE WALL FOR NEW DOOR OPENING AS REQUIRED. REFER TO NEW WORK PLANS FOR EXTENTS

6. REMOVE EXISTING FLOOR FINISH AND BASE WHERE APPLICABLE IN ITS ENTIRETY. PATCH & REPAIR ANY EXISTING CONSTRUCTION DESIGNATED TO REMAIN AS REQUIRED TO RECEIVE NEW FINISHES AND TO ACCOMMODATE NEW CONSTRUCTION. SEE PROPOSED FLOOR PLAN AND ROOM FINISH SCHEDULE FOR ADDITIONAL INFORMATION.
6. REMOVE EXISTING PLUMBING FIXTURES, ACCESSORIES AND ALL ASSOCIATED CONSTRUCTION.
7. REMOVE EXISTING WINDOWS/DELTIS SYSTEM, INCLUDING FRAME AND ALL ASSOCIATED HARDWARE/CONSTRUCTION AS REQUIRED TO ACCOMMODATE NEW CONSTRUCTION. PATCH AND REPAIR ANY EXISTING CONSTRUCTION DESIGNATED TO REMAIN.
6. REMOVE EXISTING ALUMINUM & GLASS ENTRY/STOREFRONT SYSTEM. PATCH AND REPAIR ANY EXISTING CONSTRUCTION DESIGNATED TO REMAIN AS REQUIRED TO RECEIVE NEW FINISHES AND TO ACCOMMODATE NEW CONSTRUCTION. SEE PROPOSED FLOOR PLAN AND ROOM FINISH SCHEDULE FOR ADDITIONAL INFORMATION.
5. REMOVE EXISTING ACoustICAL TILE/GWB CEILING/SOFFIT AND GRID AS REQUIRED TO RECEIVE NEW FINISHES AND ACCOMMODATE NEW CONSTRUCTION.
6. REMOVE ALL EXISTING MEP FIXTURES & ACCESSORIES. SEE REFLECTED CEILING PLAN FOR NEW CONFIGURATION.
11. REMOVE EXISTING LIGHT FIXTURES. COORDINATE WITH MEP DRAWINGS.
6. REMOVE EXISTING WALL MOUNTED HEATER. COORDINATE WITH MEP DRAWINGS. INFILL OPENING WITH METAL STUDS AND PROVIDE GWB BACK TO MATCH EXISTING.
5. EXISTING SYSTEM FURNITURE, CYCLES AND FILE CABINETS TO BE REMOVED BY OWNER UNLESS NOTED OTHERWISE.
14. REMOVE EXISTING BULLET RESISTANT TRANSACTION WINDOW SYSTEM AND DEAL TRAY INCLUDING ASS ASSOCIATED HARDWARE, TRIM, ETC. CONSTRUCTION; PATCH AND REPAIR ANY EXISTING CONSTRUCTION DESIGNATED TO REMAIN.
- REMOVE EXISTING UNIT VENTILATOR AND ALL ASSOCIATED CONSTRUCTION, UTILITY CONNECTION COUPLING AND PIPING SHALL BE REMOVED COMPLETELY WHERE NOT SCHEDULED FOR REINTEGRATION INTO NEW WORK OR FOR PERMITTING NEW WORK TO BE CAPTURED AND ABANDONED IN PLACE. UNUSED SURFACE MOUNTED ITEMS SHALL BE REMOVED. SEE MEP DRAWINGS FOR ADDITIONAL INFORMATION.
- REMOVE EXISTING TILE WANSOCT, CHAIR RAIL AND GWB UP TO TOP OF NEW WANSOCT. PATCH AND REPAIR ALL AREA OF REMOVAL AND PREP WORK AS REQUIRED FOR INSTALLATION OF NEW TILE WANSOCT, SALVAGE TILE AND CHAIR-RAIL FOR USE AS INFILL IN AREA OF ALUM & GLASS ENTRY SYSTEM REMOVAL.
17. REMOVE EXISTING TILE WANSOCT AND CHAIR-RAIL IN AREA OF ALUMINUM & GLASS ENTRY SYSTEM REMOVAL AND INFILL WITH SALVAGE TILE AND CHAIR-RAIL; INFILL WITH FULL SIZE TILE AND REPLACE A MINIMUM OF 4 LINEAR FEET OF CHAIR-RAIL.
18. REMOVE EXISTING WINDOW TREATMENT INCLUDING ALL ASSOCIATED HARDWARE; PATCH AND REPAIR ALL AREAS AFFECTED BY REMOVAL AS REQUIRED FOR NEW CONSTRUCTION.
18. REMOVE EXISTING WALL MOUNTED FIRST AID KIT, DECONTAMINANT AND ASSOCIATED SIGNAGE AND RELOCATE AS DIRECTED BY OWNER. PATCH AND REPAIR ALL AREAS AFFECTED BY REMOVAL AS REQUIRED TO RECEIVE NEW FINISHES.



SCALE: 1/4" = 1'-0"

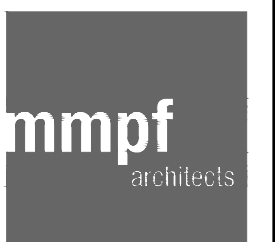
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NOTES:
1. PROVIDE TEMPORARY SHORING/BRACING AS
REQUIRED FOR INSTALLATION OF NEW LINTEL AT
NEW WALL OPENING REQUIRED AT NEW OFFICE #1;
SEE FLOOR PLAN A1.0 FOR ADDITIONAL
INFORMATION

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Peter W. Farrell AIA	AI-13618

Project

736 E LANDIS AVE
VINELAND, NEW JERSEY 08310

Drawing

Drawing

DEMOLITION
NOTES

Scale

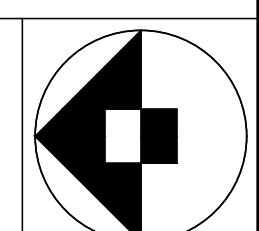
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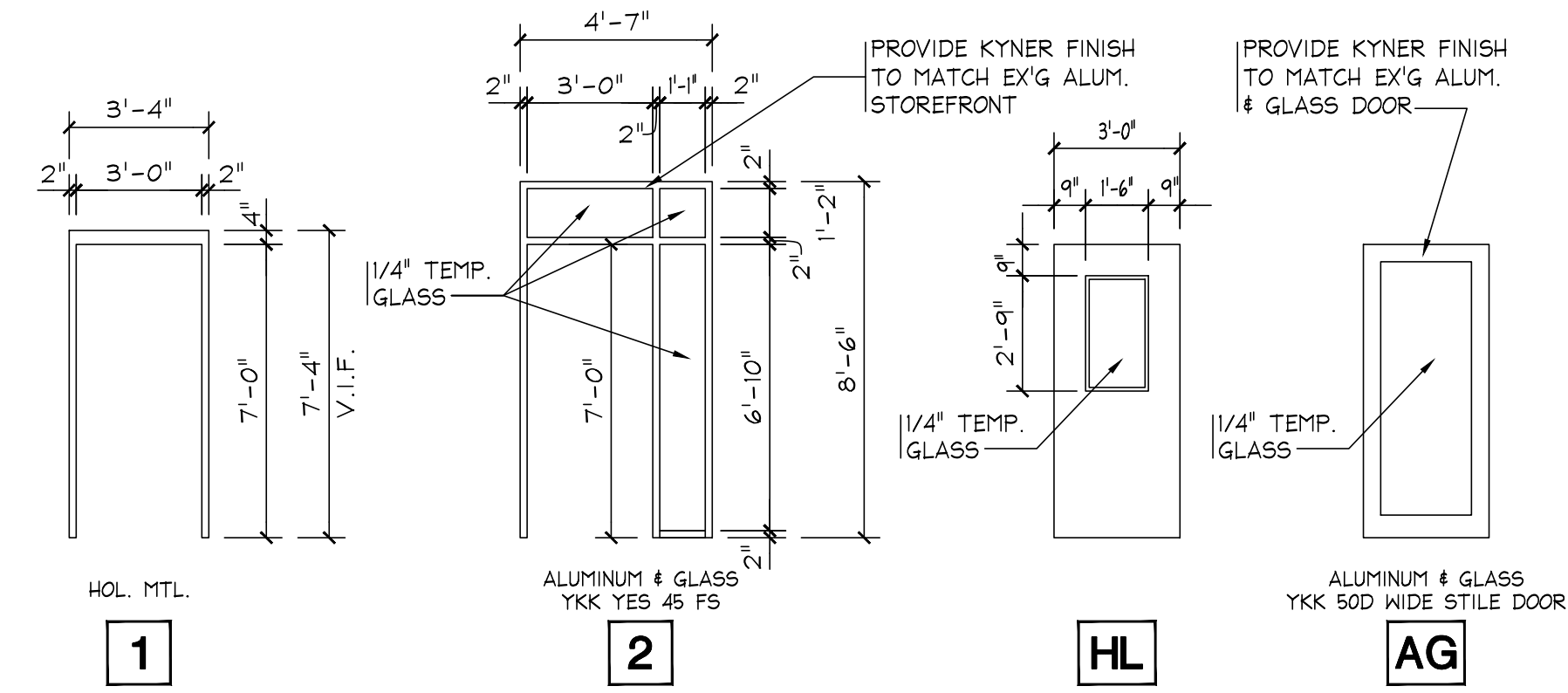


ROOM FINISH SCHEDULE

ROOM NAME	FLOOR	BASE	WALL	CLG.	HEIGHT	REMARKS
VESTIBULE	EXIST. CER. TILE	---	PTD. G.W.B./PTD. G.W.B.	EXISTING	EXISTING	
GENERAL OFFICE	CARPET TILE	VINYL	CER. TILE	ACoust. TILE	MATCH EX'G	
OFFICE #1	CARPET TILE	VINYL	PTD. G.W.B.	ACoust. TILE	9'-0"	
FILE ROOM	CARPET TILE	VINYL	PTD. G.W.B.	ACoust. TILE	10'-0"	
COPY ROOM	CARPET TILE	VINYL	PTD. G.W.B.	ACoust. TILE	MATCH EX'G	
BREAK ROOM	LVT	VINYL	PTD. G.W.B.	ACoust. TILE	8'-0"	
ALCOVE	CARPET TILE	VINYL	PTD. G.W.B.	ACoust. TILE	MATCH EX'G	

NOTES:

1. COORDINATE ALL FINISH SELECTIONS/LOCATIONS WITH OWNER..

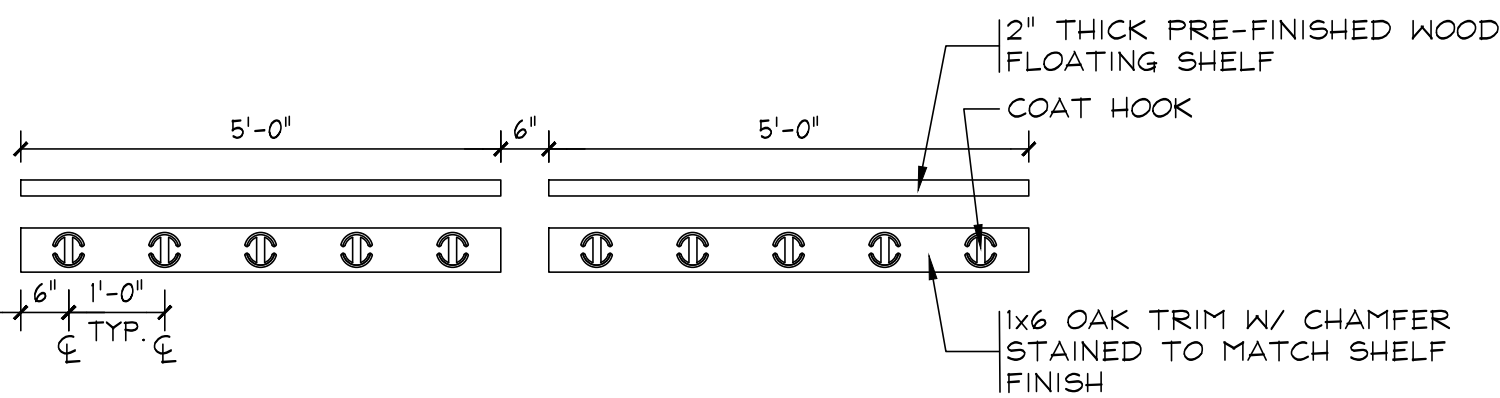


DOOR/FRAME TYPES

SCALE: 1/4" = 1'-0"

NOTES:

- DOOR #1 3'-0" x 7'-0" S.C. WOOD DOOR; PREFINISHED WITH HALF-LITE
(3) HINGES #TA2714 US26D MCKINNEY
(1) OFFICE LOCK #MP 4704/LN LESS CYLINDER 626 ASSA ABLOY ACCENTRA
(1) CYLINDER AS REQUIRED 626
(1) FLOOR STOP #44ICU 630 ROCKWOOD
(3) SILENCER # 608-RKN ROCKWOOD
- DOOR #2 3'-0" x 7'-0" WIDE STILE ALUMINUM AND GLASS DOOR, PREFINISHED KYNAR 500; YKK 50D
(1) CONTINUOUS HINGE: PEMKO CFM95HDI; 628
(1) CONCEALED VERTICAL EXIT ROD EXIT DEVICE W/MOTORIZED LATCH RETRACTION: YKK MEL36912-36; 628
(1) SMART SERIES PANIC PULL-YKK H-1541; 1" DIA 9" CTC; 628
(1) STANDAL RIM CYLINDER: YKK H-4203; 628
(1) DOOR CLOSER: NORTAN 7500XSN; 689
(1) CLOSER DROP PLATE: NORTAN 7708; 689
(1) POKER SUPPLY: FIRST CHOICE PSMEL500-1
(1) POWER TRANSFER DOOR LOOP; SECURITRON TSB-C; 630
(1) THRESHOLD: YKK H-8000 SERIES; MILL
(1) WEATHER STRIPPING PACKAGE: YKK; BLACK
- GC TO CONFIRM KEYING SYSTEM REQUIREMENTS WITH OWNER PRIOR TO ORDERING HARDWARE.

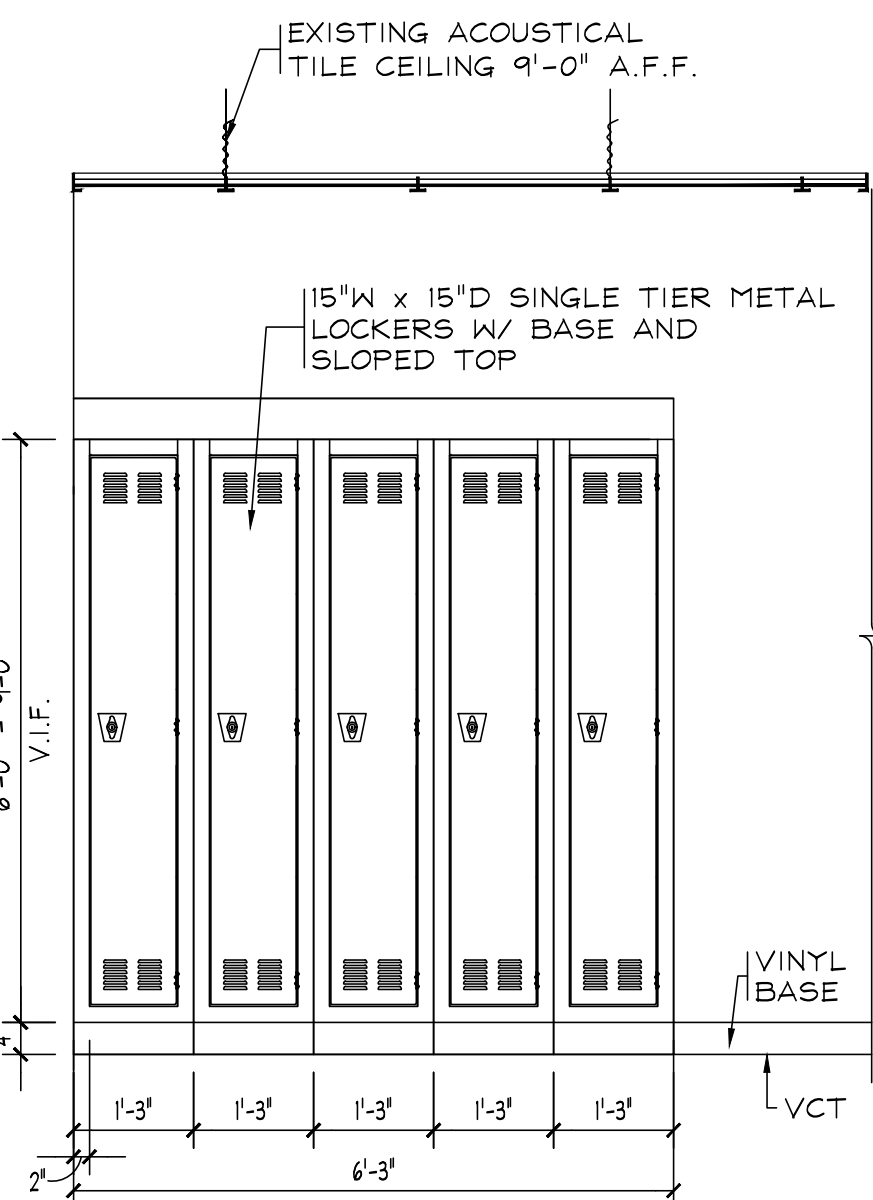


FLOATING SHELF / COAT HOOK DETAIL

SCALE: 1/2" = 1'-0"

NOTES:

- PRE-FINISHED FLOATING WOOD SHELVING TO BE MANUFACTURED BY WALLNITURE (#44,293,1858); BOIS 60" LONG FLOATING WALL SHELF WITH HIDDEN BRACKETS; 10" DEEP AND 2" THICK SOLID WOOD; OR APPROVED EQUAL; FINISH AS SELECTED BY ARCHITECT.
- COAT HOOKS TO BE MANUFACTURED BY HAFELE; LAGO DI COMO COLLECTION; MATTE ALUMINUM FINISH; MODEL NO. 843,65,900, OR APPROVED EQUAL.
- VERIFY MOUNTING HEIGHT AND FINAL LOCATION W/ OWNER.



LOCKER ELEVATION

SCALE: 1/2" = 1'-0"

NOTES:

- LOCKERS TO BE MANUFACTURED BY LIST INDUSTRIES; SUPERIOR LOCKERS HEAVY-DUTY CORRIDOR (HDC) SINGLE TIER; 15'W x 15'D x 72"H; PROVIDE CONTINUOUS AND SLOPE TOP AND 2-BASE. SEE SPECIFICATION SECTION 060010 - CARPENTRY FOR ADDITIONAL INFORMATION.

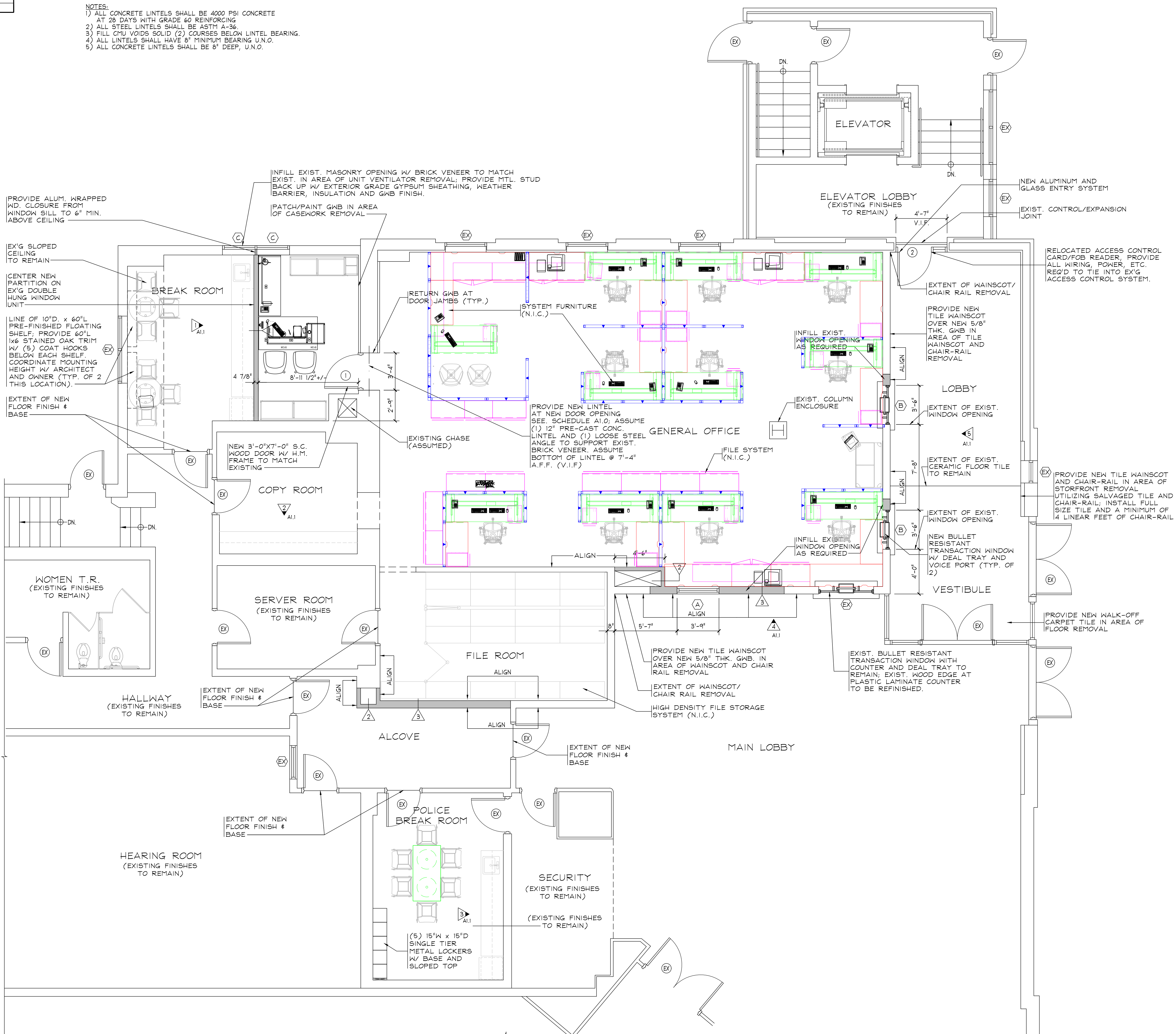
CONCRETE/STEEL LINTEL SCHEDULE

(NON-BEARING WALLS)

WIDTH OF OPENING	STEEL FOR EACH 4" OF WALL THICKNESS	REINF. CONC. FOR EACH 4" OF WALL THICKNESS	REMARKS
UP TO 2'-11"	43 1/2x3 1/2x5/16	(1) #4 TOP & BOTTOM	
3'-0" TO 3'-11"	44x3 1/2x5/16	(1) #4 TOP & BOTTOM	
4'-0" TO 5'-11"	45x3 1/2x5/16	(1) #4 TOP & BOTTOM	
6'-0" TO 8'-0"	46x3 1/2x5/16	(1) #5 TOP & BOTTOM	
8'-1" TO 10'-0"	46x3 1/2x3/8	(1) #5 TOP & BOTTOM	

NOTES:

- ALL CONCRETE LINTELS SHALL BE 4000 PSI CONCRETE AT 28 DAYS WITH GRADE 60 REINFORCING
- ALL STEEL LINTELS SHALL BE ASTM A-36
- FILL CMU VOIDS SOLID (2) COURSES BELOW LINTEL BEARING.
- ALL LINTELS SHALL HAVE 8" MINIMUM BEARING U.N.O.
- ALL CONCRETE LINTELS SHALL BE 8" DEEP, U.N.O.

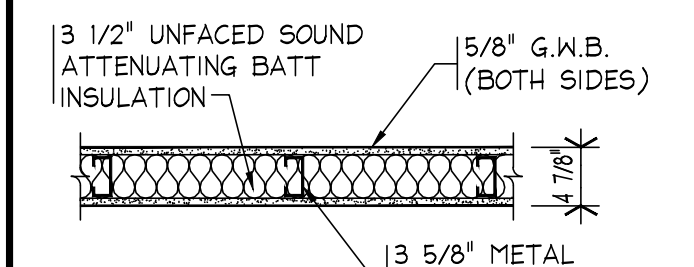


PARTIAL FIRST FLOOR PLAN

SCALE: 1/4" = 1'-0"

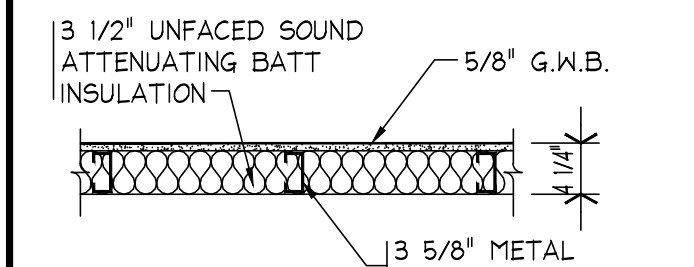
Revisions

No.	Date	Description

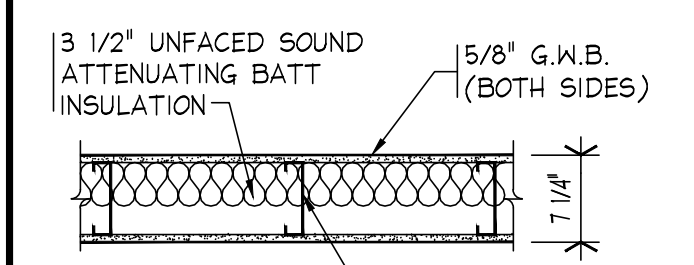


PARTITION TYPE

NOTE:
EXTEND PARTITION TO UNDERSIDE OF ROOF DECK ABOVE W/ G.W.B. ON EACH SIDE UNLESS NOTED OTHERWISE



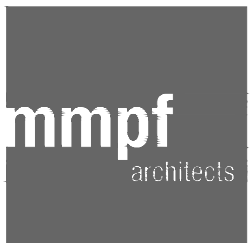
PARTITION TYPE



PARTITION TYPE

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A1-13038
A1-13618

Project

VINELAND MUNICIPAL COURT RENOVATIONS

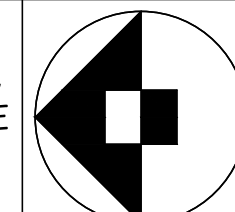
736 E. LANDIS AVE.
VINELAND, NEW JERSEY 08310

Drawing

PROPOSED FLOOR PLAN,
SCHEDULE, DOOR/FRAME
TYPES, PARTITION
TYPES

Scale AS NOTED
Job 22,019
Drawn ANA
Date 08/01/25

Sheet
A1.0
3 of 5

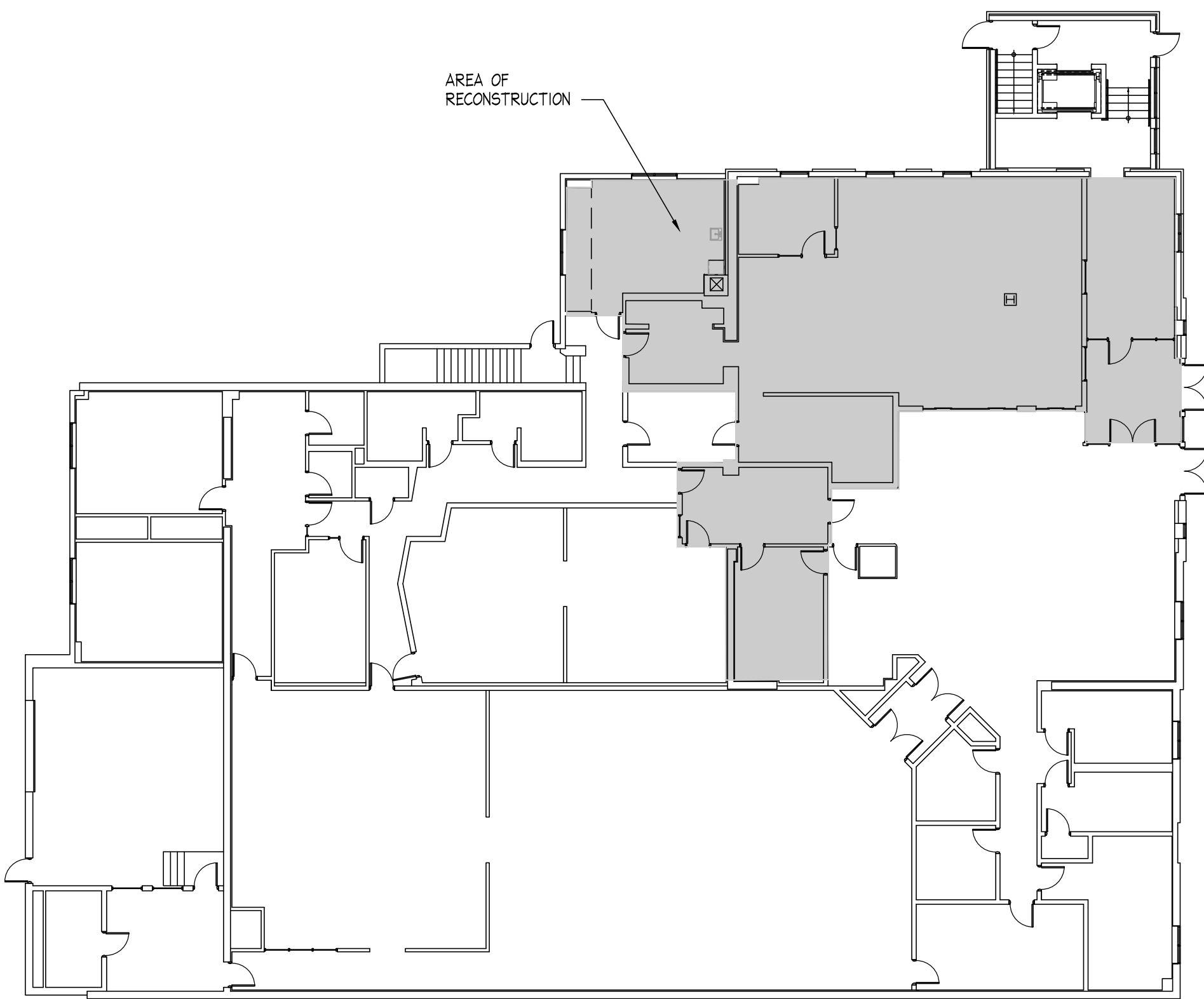




VINELAND MUNICIPAL COURT RENOVATIONS

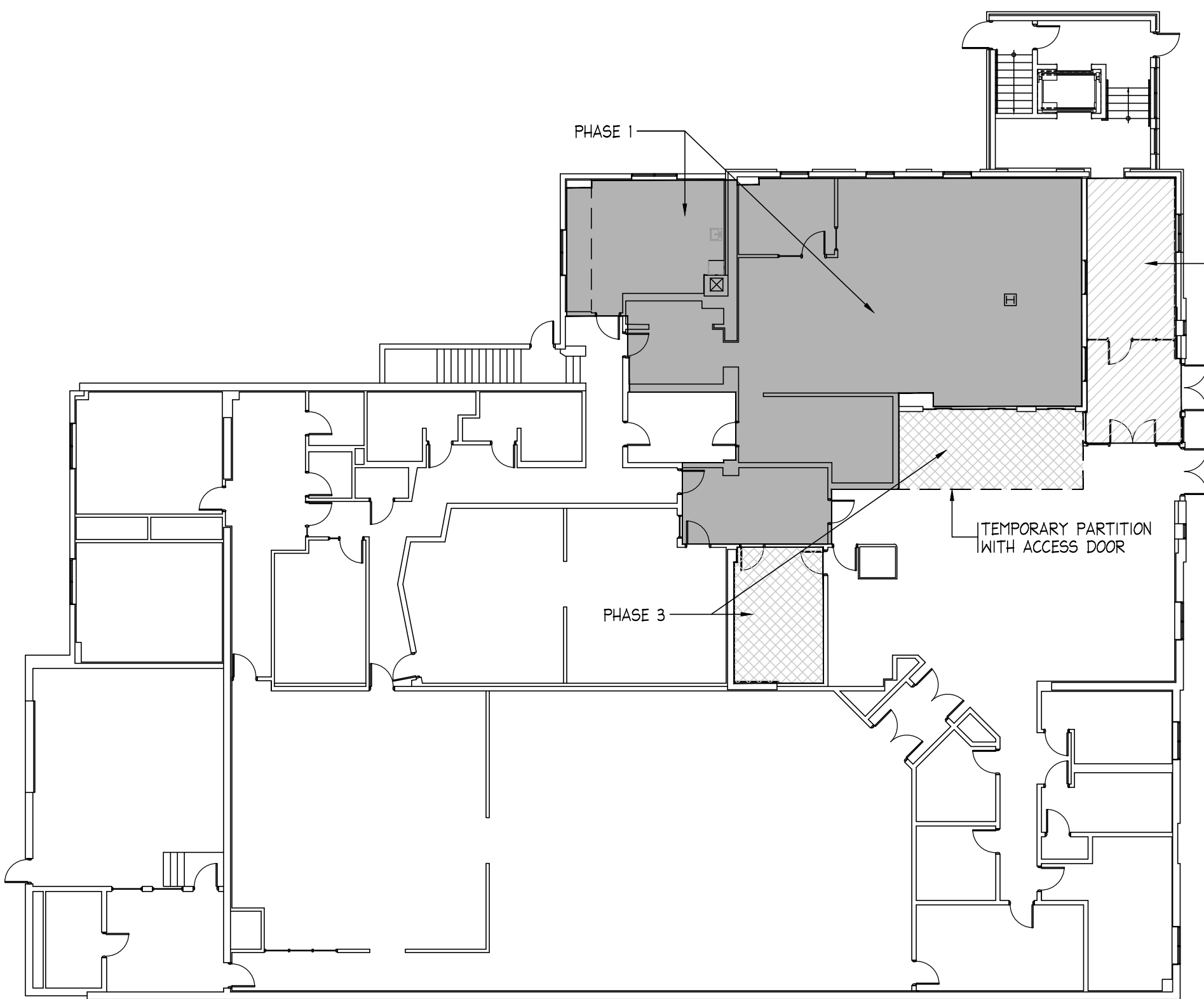
PROJECT ADDRESS: 736 EAST LANDIS AVE, VINELAND NEW JERSEY, 08360

MMPFA PROJECT #22.019



KEY PLAN

SCALE: 1/16" = 1'-0"



PHASING PLAN

SCALE: 1/16" = 1'-0"

1. REFER TO PROJECT MILESTONES IN SPECIFICATION SECTION 01000-SUMMARY OF WORK

PHASING NOTES:

- PHASE 1 INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING: ALL DEMOLITION AND NEW CONSTRUCTION REQUIRED IN THE GENERAL OFFICE, COPY ROOM, FILE ROOM, ALCOVE AND BREAK ROOM. WORK INCLUDES THE INSTALLATION OF THE NEW TRANSACTION WINDOWS, CASEWORK, FINISHES AND WORK TO THE MECHANICAL, PLUMBING AND ELECTRICAL SYSTEMS
- PHASE 2 INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING: ALL DEMOLITION AND NEW CONSTRUCTION REQUIRED IN THE EXISTING VESTIBULE AREA AND LOBBY, WORK INCLUDES THE REMOVAL OF THE INTERIOR ALUMINUM AND GLASS ENTRY SYSTEM, THE REMOVAL OF THE TILE MAINSCOT AND THE INSTALLATION OF THE NEW TILE MAINSCOT. PATCHING/PAINTING OF THE EXISTING AND NEW GMB IS ALSO INCLUDED.
- PHASE 3 INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING: THE REMOVAL OF THE EXISTING TILE MAINSCOT AND THE INSTALLATION OF THE NEW TILE MAINSCOT IN THE MAIN LOBBY AREA. PATCHING/PAINTING OF THE EXISTING AND NEW GMB IS ALSO INCLUDED. PHASE 3 ALSO INCLUDES THE INSTALLATION NEW CASEWORK AND SINK THE POLICE BREAK ROOM AND ANY PATCHING OF FINISHES REQUIRED.
- KEEP THE ENTIRE CONSTRUCTION SITE SEALED OFF FROM SURROUNDING AREAS. PROVIDE STEEL STUD WALLS WITH STUDS 16" O.C. WITH 4 MM THICK (MIN.) CORRUGATED COREX PROTECTION BOARD PANELS; FLOOR TO ROOF DECK OR CEILING/SOFFIT CONSTRUCTION ABOVE; ALL SEAMS MUST BE TAPED.
- PROVIDE TEMPORARY ACCESS DOORS WITH WEATHER STRIPPING.
- PROVIDE DUST WALK-OFF MATS AT BOTH SIDES OF ALL ENTRANCES UTILIZED FOR/DURING CONST.
- REMOVE BARRIER MATERIALS CAREFULLY TO MINIMIZE THE SPREADING OF DIRT AND DEBRIS ASSOCIATED WITH CONSTRUCTION ACTIVITIES.

DRAWING LIST			
SHEET NO.	SHEET NAME	ISSUED	
		DES.	DATE
GENERAL			
C1.0	KEY PLAN, PHASING PLAN, BUILDING DATA, DRAWING LIST AND NOTES		
ARCHITECTURAL			
D1.0	DEMOLITION PLAN, KEY NOTES		
A1.0	PROPOSED FLOOR PLAN, SCHEDULE, DOOR/FRAME TYPES, PARTITION TYPES		
A1.1	INTERIOR ELEVATIONS, DETAILS AND NOTES		
A1.2	REFLECTED CEILING PLAN		
MECHANICAL			
M0.1	HVAC LEGEND AND SCHEDULES	1	
M1.0	PARTIAL FIRST FLOOR HVAC PLAN	1	
M2.0	HVAC DETAILS	1	
PLUMBING			
P1.1	PLUMBING LEGEND, SCHEDULES AND DETAILS	1	
P1.0	PARTIAL FIRST FLOOR PLUMBING PLANS	1	
ELECTRICAL			
E1.0	FIRST FLOOR ELECTRICAL PLANS	1	
E2.0	PANEL SCHEDULES	1	
FIRE PROTECTION			
FP1.0	FIRST FLOOR FIRE PROTECTION PLAN	1	

GENERAL/DEMOLITION NOTES

- A. THE DEMOLITION DRAWINGS SHALL SERVE TO AID THE CONTRACTOR IN THE EVALUATION OF THE EXTENT OF REMOVALS, BUT SHALL NOT BE HELD TO BE ALL INCLUSIVE.
- B. CUT, PATCH & REPAIR ALL OPENINGS IN WALLS, FLOORS, CEILINGS, ETC. WHERE REQUIRED TO ACCOMMODATE NEW DESIGN. PATCHING SHALL MATCH EXISTING CONSTRUCTION & FINISHES REMAINING. COORDINATE ALL FINISHES WITH CONSTRUCTION DOCUMENTS. THIS INCLUDES LEVELING OF ALL FLOORS AND INFILLING OF ANY TRENCHED AREAS.
- C. DEMOLITION WORK SHALL INCLUDE REMOVAL OF ALL DESIGNATED ITEMS, INCLUDING BUT NOT LIMITED TO PARTITIONS, DOORS, WINDOWS, FURRING, HANGERS, UNUSED ATTACHMENTS, CEILING TILE & GRID, FLOOR FINISHES, ETC. WHERE DEMOLITION ACTIVITIES INVOLVE STRUCTURAL ELEMENTS, BEAMS, JOISTS, CMU BEARING WALLS ETC., DEMOLITION WORK SHALL BE CLOSELY COORDINATED WITH NEW CONSTRUCTION WORK. NO WORK SHALL COMMENCE WITHOUT ADEQUATE BRACING OR SHORING AS REQUIRED TO PREVENT MOVEMENT OR SETTLING IN THE EXISTING STRUCTURE. REMOVALS OF A STRUCTURAL NATURE; BEARING WALLS, ROOFS, FOOTINGS ETC., SHALL BE MADE ONLY UNDER DIRECT SUPERVISION OF QUALIFIED PERSONNEL AND SHALL BE SECURED OR OTHERWISE BRACED WHERE EVER FEASIBLE, BY INCORPORATION INTO PROPOSED NEW WORK INCLUDING BUT NOT LIMITED TO INSTALLATION OF NEW LINTELS, NEW INFILL OF CONCRETE BLOCK TO FORM NEW OPENINGS, AND NEW STEEL AT ROOF STRUCTURE AND OPENINGS, AS MUCH AS POSSIBLE NEW CONSTRUCTION IN KEEPING WITH THE PROPOSED CONDITIONS SHALL BE INSTALLED IN LIEU OF TEMPORARY BRACING.
- D. PRIOR TO COMMENCEMENT OF ANY DEMOLITION WORK, THE CONTRACTOR SHALL MEET WITH THE OWNER TO DETERMINE WHICH ITEMS, IF ANY, ARE OF SALVAGEABLE VALUE TO THE OWNER. THE CONTRACTOR IS ENCOURAGED TO ALSO DOCUMENT ANY EXISTING DAMAGE OR DEFICIENCIES, IN BOTH WRITTEN AND PHOTOGRAPHIC FORMS AS REQUIRED, WHICH ARE EVIDENT IN THE EXISTING BUILDING.
- E. ALL ITEMS DESIGNATED TO BE OF SALVAGEABLE VALUE TO THE OWNER SHALL BE REMOVED AS DIRECTED BY THE OWNER. ALL ITEMS DESIGNATED FOR DEMOLITION SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED COMPLETELY FROM THE SITE AND DISPOSED OF AS NECESSARY, IN ACCORDANCE WITH ALL REGULATIONS IN EFFECT.
- F. CONFORM TO APPLICABLE CODES FOR DEMOLITION WORK, SAFETY OF STRUCTURE AND DUST CONTROL. NOTIFY AFFECTED UTILITY COMPANIES BEFORE STARTING WORK AND COMPLY WITH THEIR REQUIREMENTS. DO NOT CLOSE OR OBSTRUCT EGRESS TO EXIST. DO NOT DISRUPT BUILDING, FIRE, OR LIFE SAFETY SYSTEMS WITHOUT (3) DAYS PRIOR WRITTEN NOTICE TO THE OWNER.
- G. MAINTAIN TEMPORARY PARTITIONS TO PREVENT THE SPREAD OF DUST, ODORS, AND NOISE, AND TO PERMIT CONTINUED OWNER OCCUPANCY. PROTECT EXISTING MATERIALS WHICH ARE NOT TO BE DEMOLISHED.
- H. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS, APPROVALS, TESTING AND INSPECTIONS AS MAY BE REQUIRED BY THE AUTHORITY HAVING JURISDICTION (AHJ). CONTRACTOR SHALL OBTAIN AND PAY FOR ALL REQUIRED DEPARTMENT OF BUILDINGS PERMITS PRIOR TO THE START OF WORK. ALL PERMITS ISSUED BY THE AUTHORITY HAVING JURISDICTION (AHJ) SHALL BE POSTED IN A CONSPICUOUS PLACE OPEN TO PUBLIC INSPECTION FOR THE ENTIRE TIME OF THE EXECUTION OF THE WORK OF THE USE AND OPERATION OF THE EQUIPMENT OR UNTIL THE EXPIRATION OF THE PERMIT.
- I. MEANS OF EGRESS SHALL BE KEPT UNOBSTRUCTED AT ALL TIMES.
- J. WRITTEN DIMENSIONS ON THESE DRAWINGS SHALL HAVE PRECEDENCE OVER SCALED DIMENSIONS. CONTRACTORS SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS ON THE JOB AND NOTIFY ARCHITECTS OFFICE OF ANY VARIATIONS FROM THE DIMENSIONS AND CONDITIONS SHOWN BY THESE DOCUMENTS. ALL CONSTRUCTION, DIMENSIONS AND DETAILS SHALL CONCUR WITH AND BE DETERMINED FROM THESE DOCUMENTS ONLY.
- K. ALL CONTRACTORS SHALL BE RESPONSIBLE FOR ADEQUATELY BRACING AND PROTECTING ALL WORK DURING CONSTRUCTION AGAINST DAMAGE, BREAKAGE, COLLAPSE, DISTORTIONS AND OFF ALIGNMENT.
- L. EXISTING CONDITIONS/CONSTRUCTION DAMAGED OR REMOVED AS A RESULT OF WORK REQUIRED TO BE COMPLETED UNDER THIS CONTRACT SHALL BE REPAIRED OR REPLACED TO ORIGINAL CONDITION AND FINISHED TO MATCH ADJACENT FINISHES BY THE CONTRACTOR AT NO COST TO THE OWNER.
- M. FILL ALL HOLES AND VOIDS IN FLOORS, WALLS, CEILINGS, ETC. WHICH RESULT FROM INSTALLATION OF NEW WORK AND REMOVAL OF EXISTING MATERIALS AND EQUIPMENT REQUIRED BY CONTRACT. PATCHED AREAS SHALL BE MADE FLUSH, FILLED WITH APPROPRIATE MATERIAL, SANDED SMOOTH & REFINISHED OR PAINTED AS APPROPRIATE TO MATCH MATERIALS, FINISHES AND LEVELS ADJACENT.
- N. CONTRACTOR SHALL VERIFY SIZE AND QUANTITY TAKEOFFS OF OWNER FURNISHED EQUIPMENT AND BE RESPONSIBLE FOR COORDINATING ROUGH-INS AND CONNECTIONS FOR SAME.
- O. ALL PROPOSED WORK SHALL INCLUDE ALL THE MATERIAL AND LABOR NECESSARY TO COMPLETE DEMOLITION AND CONSTRUCTION AS SHOWN ON THESE DRAWINGS.
- P. ALL CONTRACTORS AND SUBCONTRACTORS SHALL BE RESPONSIBLE FOR THE PROPER PERFORMANCE OF THEIR WORK, COORDINATION WITH OTHER TRADES, METHODS, SAFETY AND SECURITY ON THE JOB SITE. THE ARCHITECT AND HIS AGENT ARE NOT RESPONSIBLE OR LIABLE FOR THE ABOVE AND SHALL BE HELD HARMLESS AND INDEMNIFIED BY ALL CONTRACTORS FROM ANY CLAIMS, LOSSES, SUITS, OR LEGAL ACTIONS ARISING FROM THE PERFORMANCE OF WORK ON THIS PROJECT.
- Q. BEFORE START OF CONSTRUCTION, CONTRACTOR TO OBTAIN APPROVAL FROM BUILDING REPRESENTATIVES. ANY CONSTRUCTION INVOLVING INTERRUPTION OF BUILDING SERVICES MUST BE APPROVED AND COORDINATED WITH THE BUILDING REPRESENTATIVES BEFORE COMMENCEMENT OF WORK.
- R. ALL MATERIALS TO BE USED IN CONSTRUCTION SHALL BE NEW AND SHALL BE SUPPLIED AND INSTALLED AS PER MANUFACTURER'S SPECIFICATIONS. CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO THE FABRICATION OF ANY AND ALL ITEMS.
- S. CONTRACTOR SHALL THOROUGHLY INSPECT PREMISES NOTING ALL AREAS OF WORK AND SHALL PRODUCE A NEAT ACCEPTABLE JOB. WHERE PARTIAL REMOVAL OR PATCH OCCURS, ENTIRE SURFACE SHALL BE REFINISHED WITH QUALITY WORKMANSHIP.
- T. REMOVE AND LEGALLY DISPOSE OF ALL TRASH AND DEBRIS FROM THE SITE. NO ACCUMULATION OF TRASH OR DEBRIS SHALL BE PERMITTED.
- U. INSTALL ALL OWNER FURNISHED EQUIPMENT. THE GENERAL CONTRACTOR SHALL COORDINATE THE TRADE(S) CLAIMING THE WORK. UNLESS NOTED OTHERWISE THE INSTALLATION SHALL BE INCLUDED AS PART OF THE WORK OF THIS CONTRACT.
- V. CLOSE AND SEAL ALL OPENINGS IN WALLS, FLOORS, CEILINGS, ETC. REQUIRED BY CUTTING FOR NEW WORK TO MATCH EXISTING FINISHES AND FIRE RATING. FIRE SEAL AROUND ALL PIPES, DUCTS, CONDUITS, ETC. WHERE REQUIRED BY CODE.

Revisions

No.	Date	Description

BUILDING DATA

ALL CONSTRUCTION TO COMPLY WITH THE FOLLOWING:

STATE OF NEW JERSEY REHABILITATION SUB CODE 5-23-6; RECONSTRUCTION 2021 INTERNATIONAL BUILDING CODE - NEW JERSEY EDITION AS REFERENCED BY THE REHABILITATION SUB CODE

BARRIER FREE SUBCODE - ICC/ANSI 117.1-2017

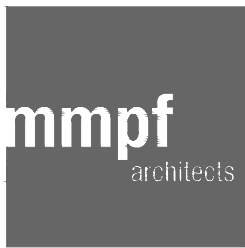
CONSTRUCTION CLASSIFICATION: 3B
AREA OF RECONSTRUCTION: 2,994 SF
NON-SEPARATED: 5-1 AND A-3
CURRENT USE GROUP: MIXED USE NON-SEPARATED 5-1 AND A-3
PROPOSED USE GROUP: MIXED USE NON-SEPARATED 5-1 AND A-3

NOTES:

- BUILDING IS EQUIPPED THROUGHOUT WITH AN AUTOMATIC FIRE SUPPRESSION SYSTEM.
- PROPOSED RENOVATIONS DO NOT IMPACT OCCUPANCY, TRAVEL DISTANCE OR EGRESS REQUIREMENTS

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A1-07220
A1-07473
A1-19038
A1-19618

Project

VINELAND MUNICIPAL COURT RENOVATIONS

736 E. LANDIS AVE
VINELAND, NEW JERSEY 08310

Drawing

KEY PLAN, PHASING PLAN, BUILDING DATA, DRAWING LIST AND NOTES

Scale

AS NOTED

Job

22.019

Sheet

C1.0

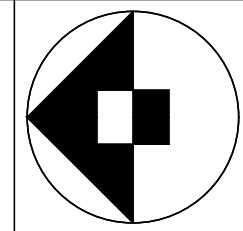
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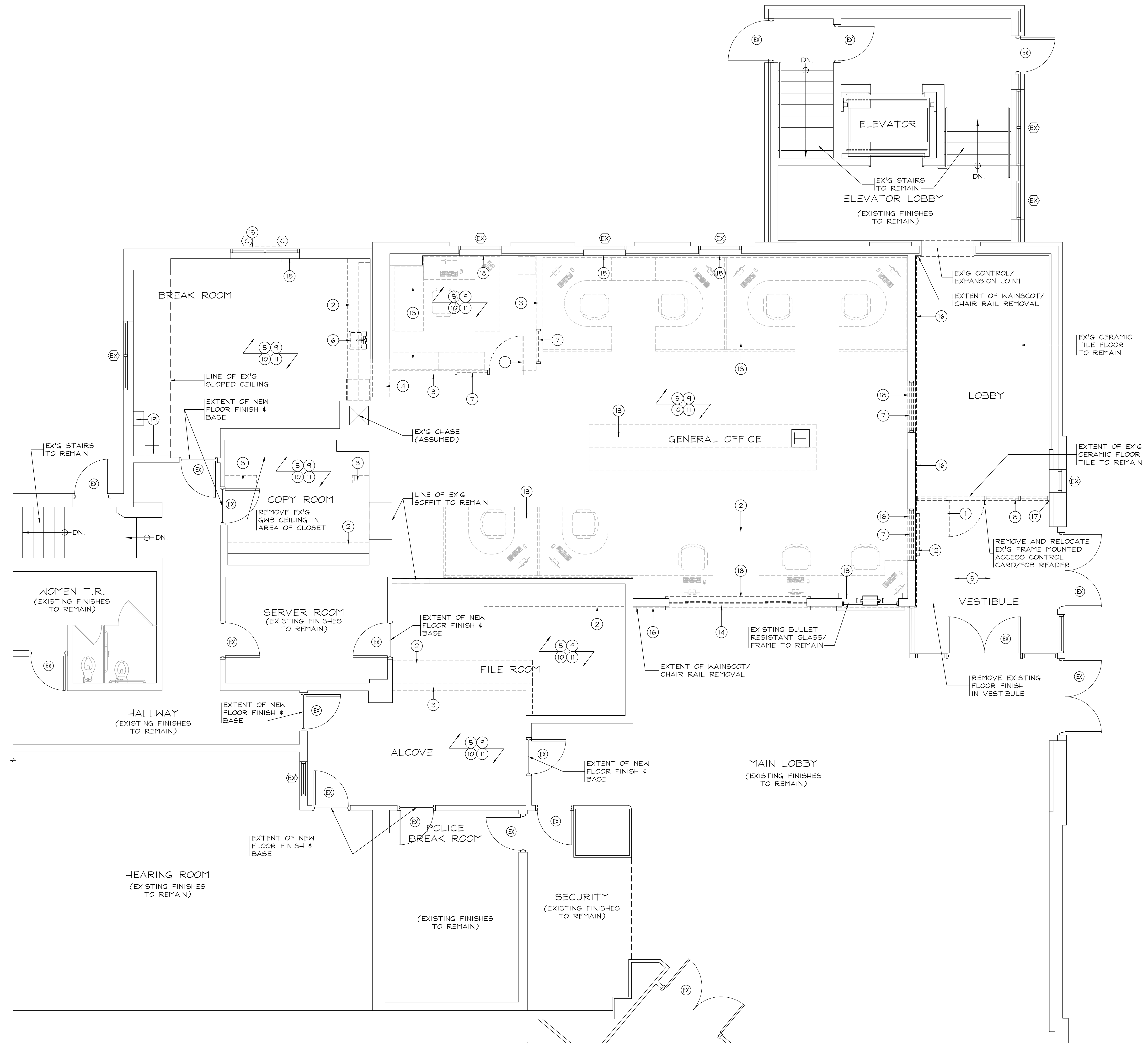
08/01/25

1 of 5



- ① REMOVE EXISTING DOOR, FRAME AND ALL ASSOCIATED HARDWARE/CONSTRUCTION AS REQUIRED TO ACCOMMODATE NEW CONSTRUCTION. PATCH AND REPAIR ANY EXISTING CONSTRUCTION DAMAGE AND TO REPAIR TO ORIGINAL CONDITION.
- ② REMOVE EXISTING CASEWORK/SHELVING IN THIS AREA COMPLETELY; PATCH ALL AREAS AFFECTED BY REMOVAL AS REQUIRED FOR NEW CONSTRUCTION.
- ③ REMOVE EXISTING WALL CONSTRUCTION COMPLETELY/PARTIALLY, AND AS REQUIRED TO ACCOMMODATE NEW CONSTRUCTION. UTILITY CONNECTIONS, CONDUIT AND PIPING SHALL BE REMOVED COMPLETELY WHERE NOT SCHEDULED FOR INCORPORATION INTO NEW WORK OR, IF NOT PERMITTED TO BE REMOVED, TO BE REPAIRED IN PLACED SURFACE MOUNTED ITEMS SHALL BE REMOVED. SEE MEP DWGS FOR ADDITIONAL INFORMATION.
- ④ REMOVE WALL/PARTITION OR PORTION OF THE WALL FOR NEW DOOR OPENING AS REQUIRED. REFER TO NEW WORK PLANS FOR EXTENTS

6. REMOVE EXISTING FLOOR FINISH AND BASE WHERE APPLICABLE IN ITS ENTIRETY. PATCH & REPAIR ANY EXISTING CONSTRUCTION DESIGNATED TO REMAIN AS REQUIRED TO RECEIVE NEW FINISHES AND TO ACCOMMODATE NEW CONSTRUCTION. SEE PROPOSED FLOOR PLAN AND ROOM FINISH SCHEDULE FOR ADDITIONAL INFORMATION.
6. REMOVE EXISTING PLUMBING FIXTURES, ACCESSORIES AND ALL ASSOCIATED CONSTRUCTION.
7. REMOVE EXISTING WINDOWS/DELTIS SYSTEM, INCLUDING FRAME AND ALL ASSOCIATED HARDWARE/CONSTRUCTION AS REQUIRED TO ACCOMMODATE NEW CONSTRUCTION. PATCH AND REPAIR ANY EXISTING CONSTRUCTION DESIGNATED TO REMAIN.
6. REMOVE EXISTING ALUMINUM & GLASS ENTRY/STOREFRONT SYSTEM. PATCH AND REPAIR ANY EXISTING CONSTRUCTION DESIGNATED TO REMAIN AS REQUIRED TO RECEIVE NEW FINISHES AND TO ACCOMMODATE NEW CONSTRUCTION. SEE PROPOSED FLOOR PLAN AND ROOM FINISH SCHEDULE FOR ADDITIONAL INFORMATION.
5. REMOVE EXISTING ACoustICAL TILE/GWB CEILING/SOFFIT AND GRID AS REQUIRED TO RECEIVE NEW FINISHES AND ACCOMMODATE NEW CONSTRUCTION.
6. REMOVE ALL EXISTING MEP FIXTURES & ACCESSORIES. SEE REFLECTED CEILING PLAN FOR NEW CONFIGURATION.
11. REMOVE EXISTING LIGHT FIXTURES. COORDINATE WITH MEP DRAWINGS.
6. REMOVE EXISTING WALL MOUNTED HEATER. COORDINATE WITH MEP DRAWINGS. INFILL OPENING WITH METAL STUDS AND PROVIDE GWB BACK TO MATCH EXISTING.
5. EXISTING SYSTEM FURNITURE, CYCLES AND FILE CABINETS TO BE REMOVED BY OWNER UNLESS NOTED OTHERWISE.
14. REMOVE EXISTING BULLET RESISTANT TRANSACTION WINDOW SYSTEM AND DEAL TRAY INCLUDING ASS ASSOCIATED HARDWARE, TRIM, ETC. CONSTRUCTION; PATCH AND REPAIR ANY EXISTING CONSTRUCTION DESIGNATED TO REMAIN.
- REMOVE EXISTING UNIT VENTILATOR AND ALL ASSOCIATED CONSTRUCTION, UTILITY CONNECTION COUPLING AND PIPING SHALL BE REMOVED COMPLETELY WHERE NOT SCHEDULED FOR REINTEGRATION INTO NEW WORK OR FOR PERMITTING NEW WORK TO BE CAPTURED AND ABANDONED IN PLACE. UNUSED SURFACE MOUNTED ITEMS SHALL BE REMOVED. SEE MEP DRAWINGS FOR ADDITIONAL INFORMATION.
- REMOVE EXISTING TILE WAINSCOT, CHAIR RAIL AND GWB UP TO TOP OF NEW WAINSCOT. PATCH AND REPAIR ALL AREA OF REMOVAL AND PREP WORK AS REQUIRED FOR INSTALLATION OF NEW TILE WAINSCOT, SALVAGE TILE AND CHAIR-RAIL FOR USE AS INFILL IN AREA OF ALUM & GLASS ENTRY SYSTEM REMOVAL.
17. REMOVE EXISTING TILE WAINSCOT AND CHAIR-RAIL IN AREA OF ALUMINUM & GLASS ENTRY SYSTEM REMOVAL AND INFILL WITH SALVAGE TILE AND CHAIR-RAIL; INFILL WITH FULL SIZE TILE AND REPLACE A MINIMUM OF 4 LINEAR FEET OF CHAIR-RAIL.
18. REMOVE EXISTING WINDOW TREATMENT INCLUDING ALL ASSOCIATED HARDWARE; PATCH AND REPAIR ALL AREAS AFFECTED BY REMOVAL AS REQUIRED FOR NEW CONSTRUCTION.
18. REMOVE WALL MOUNTED FIRST AID KIT, DECONTAMINANT AND ASSOCIATED SIGNAGE AND RELOCATE AS DIRECTED BY OWNER. PATCH AND REPAIR ALL AREAS AFFECTED BY REMOVAL AS REQUIRED TO RECEIVE NEW FINISHES.



SCALE: 1/4" = 1'-0"

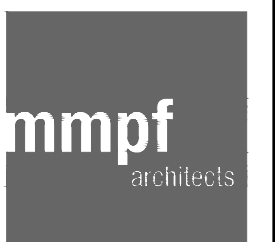
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NOTES:
1. PROVIDE TEMPORARY SHORING/BRACING AS
REQUIRED FOR INSTALLATION OF NEW LINTEL AT
NEW WALL OPENING REQUIRED AT NEW OFFICE #1;
SEE FLOOR PLAN A1.0 FOR ADDITIONAL
INFORMATION

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Project

VINELAND MUNICIPAL COURT RENOVATIONS

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VINELAND, NEW JERSEY 08310

Drawing

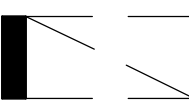
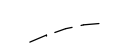
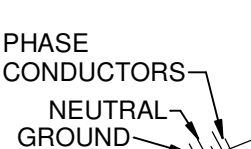
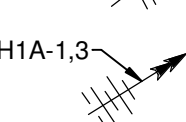
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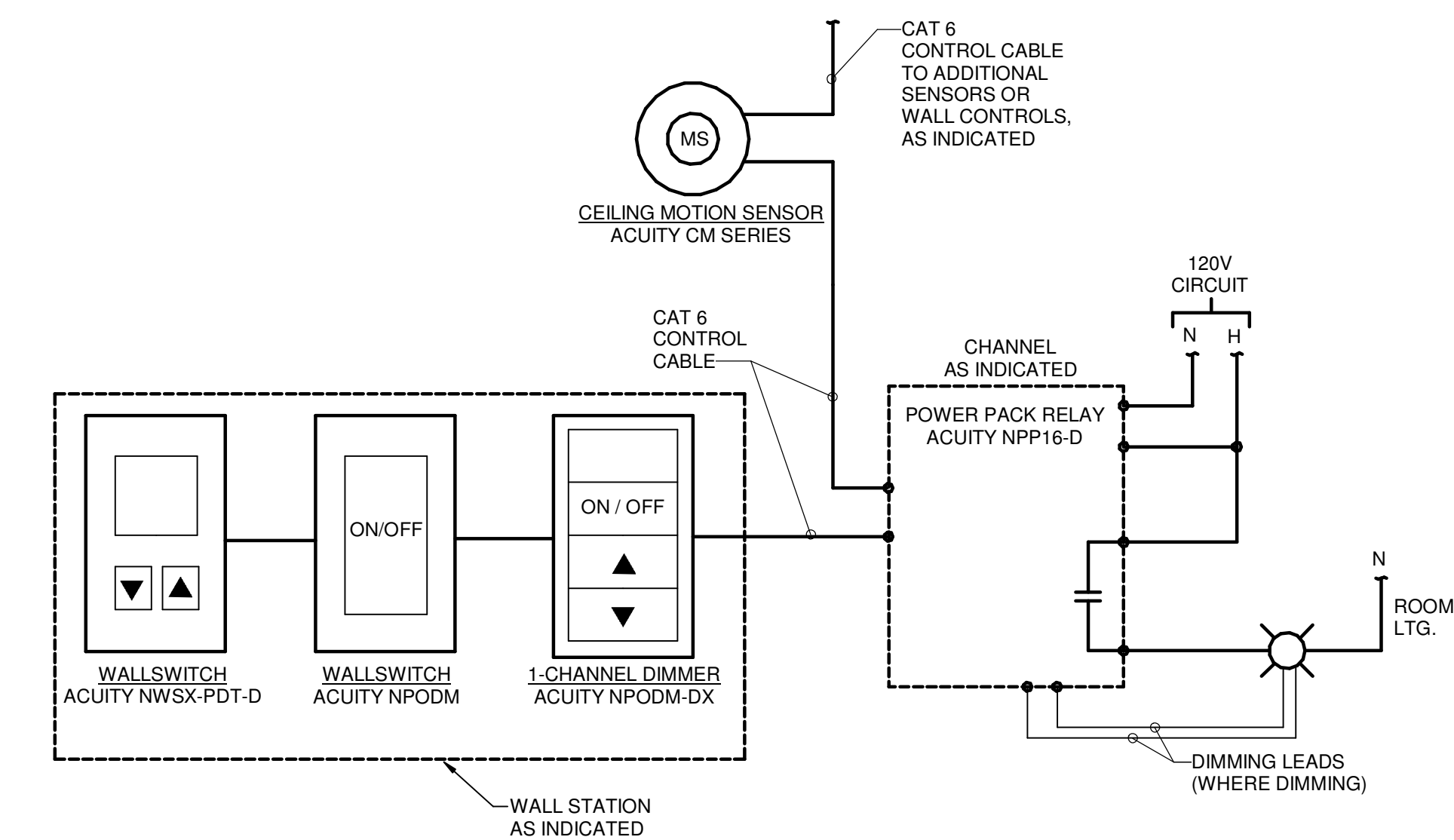
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2 of 5

LIGHTING  PENDANT MOUNTED LIGHTING FIXTURE AS SCHEDULED.  WALL MOUNTED LIGHTING FIXTURE AS SCHEDULED.  CEILING OUTLET AND LIGHTING FIXTURE AS SCHEDULED.  CEILING OUTLET AND LIGHTING FIXTURE AS SCHEDULED. FIXTURE SERVES AS EGRESS LIGHTING.  CEILING OUTLET AND EXIT LIGHT FIXTURE AS SCHEDULED.  WALL OUTLET AND EXIT LIGHT FIXTURE AS SCHEDULED.  ARROWS INDICATE EGRESS EXIT SIGNAGE CHEVRON(S) REQUIRED.  SYMBOL INDICATES FIXTURE TYPE WHEN SHOWN ON LIGHTING PLANS ADJACENT TO FIXTURE.  LOWER CASE LETTERS AT OUTLETS INDICATES SWITCHING ARRANGEMENT.  SINGLE POLE 20A SWITCH. MOUNT 48" A.F.F. TO TOP, UNLESS NOTED OTHERWISE.  LV = LOW VOLTAGE CONTROLLER SIMILAR TO ACUTY NPQDM MS = VACANCY SENSOR SIMILAR TO ACUTY WSK-PDT OR + LOW VOLTAGE TIME/CLOCK OVERRIDE SWITCH. CONFIRM PROGRAMMING TIME WITH OWNER.  DIMMER SWITCH. MOUNT 48" A.F.F. TO TOP UNLESS NOTED OTHERWISE.  LV+LOW VOLTAGE CONTROLLER SIMILAR TO ACUTY NPQDM-DX MS = VACANCY SENSOR SIMILAR TO ACUTY WSK-PDT-DX  CEILING OUTLET AND DUAL TECHNOLOGY MOTION SENSOR FOR LIGHTING CONTROL WITH AUTOMATIC AND MANUAL-ON CONTROL OPERATION. ACUTY CM SERIES OR APPROVED EQUAL.  OUTLET BOX MOUNT 20A MOUNT LOW VOLTAGE SENSOR POWER PAK. SENSOR SHALL BE SIMILAR TO ACUTY NPP16D	POWER  WALL MOUNTED JUNCTION BOX. MOUNT AT 18" A.F.F. TO BOTTOM, UNLESS NOTED OTHERWISE.  CEILING OR FLOOR MOUNTED JUNCTION BOX.  WALL OUTLET WITH 20A, 125V DUPLEX RECEPTACLE. MOUNT 18" A.F.F. TO BOTTOM, UNLESS NOTED OTHERWISE. "ST" INDICATES SAFETY TYPE RECEPTACLE.  WALL OUTLET WITH 20A, 125V DOUBLE DUPLEX (QUADRAPLEX) RECEPTACLE. MOUNT AT 18" A.F.F. TO BOTTOM UNLESS NOTED OTHERWISE.  WALL OUTLET WITH 20A, 125V DUPLEX RECEPTACLE FOR TV DISPLAY. MOUNT 96" A.F.F. TO BOTTOM, UNLESS NOTED OTHERWISE.  208Y/120V SURFACE MOUNTED PANELBOARD. DASH LINE INDICATES N.E.C. CLEARANCE.  FUSIBLE DISCONNECT SWITCH. MOUNT 4"-6" A.F.F. TO CENTER, UNLESS NOTED OTHERWISE. DASH LINE INDICATES N.E.C. CLEARANCE.  MANUAL MOTOR CONTROLLER WITH PILOT LIGHT TO SUIT MOTOR. MOUNT 48" A.F.F. TO TOP, UNLESS NOTED OTHERWISE.
GENERAL DEVICE SUBSCRIPTS "1,2,3" NUMBER AT OUTLET INDICATES CIRCUIT ARRANGEMENT. "NL" SUBSCRIPT INDICATED LIGHTING FIXTURE IS NON-SWITCHED AND SERVES AS NIGHTLIGHT. "GFI" INDICATES GROUND FAULT CURRENT INTERRUPTER DEVICE. "EX-" INDICATES EXISTING WHEN SHOWN ADJACENT TO SYMBOLS ON LIGHTING, POWER, OR SYSTEMS PLANS. "AC-" INDICATES MOUNT VERTICALLY 6" ABOVE COUNTER/COUNTER BACK/SPLASH TO BOTTOM, WHEN SHOWN ON POWER OR SYSTEMS PLANS. "S" INDICATES SURFACE MOUNTED DEVICE WHEN INDICATED ON POWER & SYSTEMS PLANS. "TV-" INDICATES RECEPTACLE IS DEDICATED FOR TELEVISION WHEN SHOWN ON POWER OR SYSTEMS PLANS. VERIFY MOUNTING HEIGHT WITH ARCHITECTURAL ELEVATIONS BEFORE ROUGH-IN.	FIRE ALARM SYSTEM  FIRE ALARM SYSTEM VISUAL UNIT. WALL MOUNT AT 80" A.F.F. TO STROBE.  FIRE ALARM SYSTEM AUDIO/VISUAL UNIT. MOUNT 80" A.F.F. TO STROBE.  MANUAL FIRE ALARM ADDRESSABLE PULL STATION. MOUNT 48" A.F.F. TO TOP.  CEILING MOUNTED SMOKE DETECTOR.  CEILING MOUNTED COMBINATION SMOKE/CO DETECTOR
	TELECOMMUNICATIONS & TELEVISION  OUTLET BOX IN WALL FOR DATA JACKS AND DEVICE PLATE. PROVIDE 1-1/4" CONDUIT FROM OUTLET BOX TO ACCESSIBLE CEILING CAVITY AND BUSH END. PROVIDE CATS CABLE FROM EACH JACK IN OUTLET BOX TO TELECOMMUNICATIONS SYSTEM EQUIPMENT AT RACK IN IT ROOM VIA J-HOOKS AND TERMINATE. COORDINATE LOCATION OF J-HOOKS WITHIN CEILING CAVITY WITH DUCTWORK.
	RACEWAYS  CIRCUIT CONCEALED BENEATH FLOOR.  PHASE CONDUCTORS NEUTRAL-GROUND  HIA-1.3  CIRCUIT CONCEALED IN CEILING OR WALL. CROSSBAR'S INDICATE NUMBER OF CONDUCTORS REQUIRED. CONDUIT NOT SIZED IS 3/4". CONDUCTORS NOT SIZED ARE NO. 12.  HOMERUN TO PANELBOARD INDICATED. NUMBER OF ARROWHEADS INDICATES CIRCUIT NUMBERS. PREFIX INDICATES PANEL NUMBER.  EQUIPMENT POINT OF CONNECTION. VERIFY WITH EQUIPMENT PROVIDER AND/OR INSTALLER.



4 LOW VOLTAGE LIGHTING CONTROL DETAIL - POWER PACK
SCALE: NONE

SCALE: NONE

GENERAL ELECTRICAL NOTES:

- A. THE DRAWINGS AND EACH SPECIFICATION SECTION ARE COMPLEMENTARY. ONE TO THE OTHER, AND WHICH IS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS SECTION SHALL BE AS DRAWING AS IF IT WERE SHOWN ON ALL DRAWINGS AND CALLED FOR IN EACH SPECIFICATION SECTION.
- B. THE INFORMATION SHOWN ON THE DRAWINGS IS BASED ON FIELD OBSERVATIONS, DIRECTORY INFORMATION LISTED IN PANELS, AND REVIEW OF AVAILABLE DRAWINGS. DISCREPANCIES HAVE BEEN OBSERVED. CIRCUITS HAVE NOT BEEN RUNG OUT.
- C. THE CONTRACTOR SHALL RING OUT THE CIRCUITS AFFECTED BY THIS PROJECT. ANY DISCREPANCIES DISCOVERED SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.
- D. THE CONTRACTOR SHALL BRING ANY QUALITY CHECKS THAT EXIST IN THESE DOCUMENTS TO THE ATTENTION OF THE ARCHITECT FOR RESOLUTION. THE ARCHITECT SHALL HAVE THE SOLE DISCRETION TO PROVIDE INTERPRETATIONS OF THE INTENT OF THE CONTRACT DOCUMENTS AND THE INTERPRETATION SHALL SERVE TO CORRECT THE CONTRACTOR TO THE WORK REQUIRED.
- E. THE DRAWINGS ARE DIAGRAMMATIC IN NATURE, INDICATE THE GENERAL SCOPE OF THE WORK, AND INDICATE THE GENERAL ARRANGEMENT OF EQUIPMENT AND DEVICES. THE CONTRACTOR SHALL COORDINATE AND WORK WITH EXISTING CONDITIONS. THE CONTRACTOR SHALL VERIFY THE SIZE AND SERVICE REQUIREMENTS FOR EACH ITEM AND SHALL PROVIDE SERVICES COMPATIBLE WITH EACH ITEM.
- F. THE CONTRACTOR SHALL STUDY THE PROJECT SITE TO BECOME FAMILIAR WITH PROJECT CONDITIONS. THE CONTRACTOR SHALL VERIFY THE EXTENT OF THE WORK BEFORE STARTING CONSTRUCTION ACTIVITIES.
- G. ALL WORK SHALL CONFORM WITH THE CURRENTLY ADOPTED BUILDING CODES AND STANDARDS FOR VINELAND, NEW JERSEY.
- H. PROVIDE SEISMIC RESTRAINTS IN ACCORDANCE WITH APPLICABLE CODES. RESTRAINTS SHALL WITHSTAND THE EFFECT OF EARTHQUAKE MOTIONS AS DETERMINED ACCORDING TO ASCE 7-10.
- I. THE CONTRACTOR SHALL COORDINATE CIRCUIT ROUTING WITH EXISTING CONSTRUCTION AND EXISTING EQUIPMENT TO AVOID CONFLICTS WITH EQUIPMENT AND THE ASSOCIATED ACCESS REQUIREMENTS.
- J. ALL PENETRATIONS OF RATED WALLS, FLOORS, CEILING, SHALL BE SEALED WITH MATERIAL CAPABLE OF PREVENTING THE PASSAGE OF FIRE AND SMOKE.
- K. PROVIDE FIRE INTUMESCENT PUTTY PADS AROUND ALL BOXES INSTALLED IN FIRE RATED WALLS.
- L. ALL JUNCTION BOXES, PULL BOXES, AND OUTLET BOXES SHALL BE LABELED WITH THE CIRCUITS CONTAINED THEREIN. INFORMATION SHALL INCLUDE SOURCE OF CIRCUITS AND CIRCUIT NUMBERS.
- M. DEDICATED NEUTRALS SHALL BE PROVIDED FOR ALL CIRCUITS REQUIRING A NEUTRAL. UNDER NO CIRCUMSTANCES SHALL CIRCUITS SHARE A NEUTRAL.
- N. SINGLE PHASE AND THREE PHASE CIRCUITS SHALL NOT OCCUPY THE SAME RACEWAY.
- O. PROVIDE A GREEN GROUNDING CONDUCTOR IN EVERY RACEWAY.
- P. ALL CIRCUIT SHALL CONSIST OF INDIVIDUAL CONDUCTORS IN EMT RACEWAY EXCEPT WHERE TYPE MC AND TYPE AC CABLE IS SPECIFICALLY ALLOWED.
- Q. MULTIPLE HOUSING FROM A SINGLE JUNCTION BOX ARE NOT PERMITTED.
- R. FINAL CONNECTION TO CEILING MOUNTED OUTLET BOXES SHALL BE MADE WITH FLEXIBLE CONDUIT ON METAL ARMORED CABLE.
- S. FLEXIBLE METALLIC RACEWAYS AND METAL ARMORED CABLES SHALL NOT PASS THROUGH WALLS AND SHALL NOT BE USED TO MAKE CONNECTIONS BETWEEN DEVICES IN SEPARATE ROOMS. A METAL ARMORED CABLE MAY SERVE AN OUTLET ON A COMMON WALL BETWEEN ROOMS AND TERMINATE IN THE ADJACENT ROOM.
- T. CIRCUIT NUMBERS SHOWN ADJACENT TO DEVICES INDICATE REQUIRED CIRCUIT ARRANGEMENT.
- U. EXISTING CIRCUITS MAY BE UTILIZED TO SERVE NEW EQUIPMENT WHERE SPECIFICALLY ALLOWED.

SHEET NOTES:

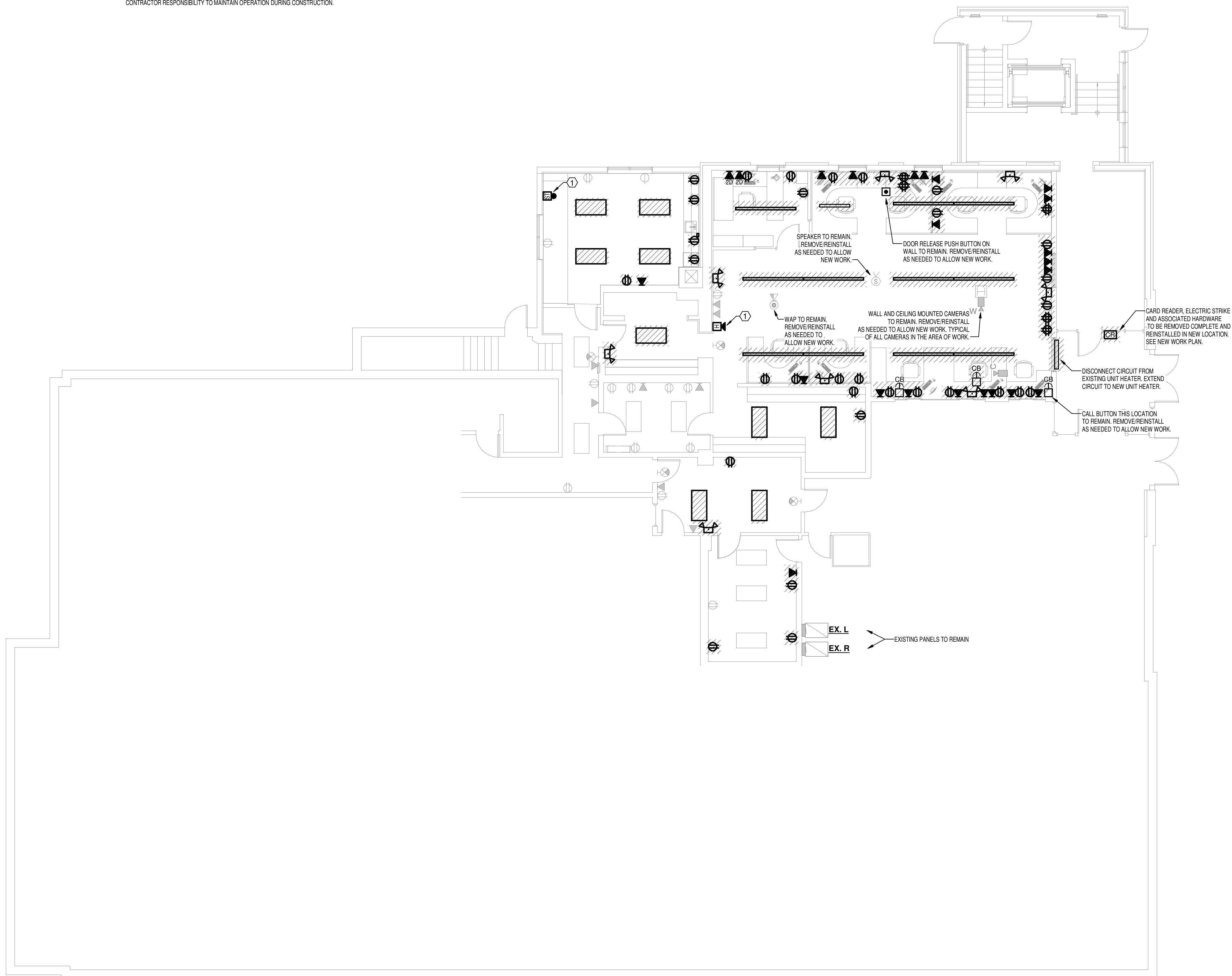
1. REMOVE FIRE ALARM DEVICES TO RELOCATE. EXTEND EXISTING CIRCUIT TO NEW LOCATION. REFER TO ARCHITECTURAL SHEETS FOR CONSTRUCTION PHASING PLANS. IT IS CONTRACTOR RESPONSIBILITY TO MAINTAIN OPERATION DURING CONSTRUCTION.

GENERAL ELECTRICAL REMOVAL NOTES:

- A. THE REMOVAL DRAWINGS SHALL SUBMIT TO THE CONTRACTOR IN ITS EVALUATION OF THE EXTENT OF REMOVALS, BUT SHALL NOT BE ASSUMED TO BE ALL INCLUSIVE.
- B. THE CONTRACTOR SHALL VISIT THE PROJECT SITE TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS AND TO VERIFY THE EXTENT OF REMOVALS.
- C. ALL EQUIPMENT NOTED FOR "SAVAGE" SHALL BE REMOVED IN SUCH A MANNER THAT WILL ALLOW REUSE. SAVERED ITEMS THAT WILL BE INSTALLED IN THE NEW WORK, SHALL BE CATALOGED, PROTECTED, AND STORED UNTIL THE TIME FOR INSTALLATION. ITEMS DETERMINED BY THE OWNER TO BE SAVERAGE, WHICH WILL NOT BE REINSTALLED IN THE NEW WORK, SHALL REMAIN THE PROPERTY OF OWNER AND SHALL BE DELIVERED TO THE DESIGNATED LOCATION ON THE PREMISES. CONTRACTOR SHALL LEGALLY DISPOSE OF ALL OTHER PORTIONS OF MATERIAL, AND EQUIPMENT.
- D. IF PORTIONS OF CIRCUITS SERVING EQUIPMENT, WHICH WILL REMAIN, MUST BE RELOCATED OR REMOVED DUE TO OTHER REMOVAL OR DUE TO INTERFERENCE WITH THE NEW WORK, THE CIRCUITS SHALL BE WORKED IN SUCH A MANNER THAT WILL ASSURE THE PROPER OPERATION OF THE EQUIPMENT AFTER CONSTRUCTION IS COMPLETE. USE THE SAME TYPE OF CONDUCTORS AND SIZE OF RACEWAY TO MATCH ALL REQUIRED MODIFICATIONS.
- E. IF REMOVALS OCCUR, WHICH EXPOSE CIRCUITS WHICH MUST REMAIN, THE CIRCUITS SHALL BE RELOCATED OR MODIFIED IN SUCH A MANNER THAT WILL ENSURE CONTINUED OPERATION OF THE CIRCUIT. EXISTING RACEWAYS EXPOSED DURING REMOVALS, WHICH MUST REMAIN, SHALL BE SUPPORTED IN ACCORDANCE WITH THE REQUIREMENTS FOR NEW RACEWAYS.
- F. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REMOVALS, WHETHER OR NOT SPECIFICALLY IDENTIFIED ON NOTED.
- G. ALL HATCHED ITEMS SHALL BE DISCONNECTED AND REMOVED.
- H. ALL CONDUITS, WHICH SERVED REMOVED ITEMS AND WHICH WILL NOT BE UTILIZED TO SERVE REINSTALLED OR NEW DEVICES, SHALL BE REMOVED FROM RACEWAYS.
- I. ALL CABLES, WHICH SERVED REMOVED ITEMS AND WHICH WILL NOT BE UTILIZED TO SERVE REINSTALLED OR NEW DEVICES, SHALL BE REMOVED.
- J. ALL RACEWAYS, WHICH SERVED REMOVED ITEMS AND WHICH WILL NOT BE UTILIZED TO SERVE NEW CIRCUITS, SHALL BE REMOVED WHERE EXPOSED OR WHERE ACCESSIBLE. CABLES AND RACEWAYS CONCEALED UNDERGROUND, IN WALLS, OR ABOVE NON-REMOVABLE CEILING(S) MAY BE ABANDONED IN PLACE. ABANDONED RACEWAYS SHALL BE PLUGGED AT BOTH ENDS.
- K. PATCHING IN WALLS, SHALL INCLUDE ALL BOXES, HANGERS, BEAMS, CABLES, AND MISCELLANEOUS SUPPORTS.
- L. PATCH OPENING IN REMOVALS, FLOORS, AND CEILINGS WHERE THE REMOVAL OF MATERIAL OR EQUIPMENT CREATES OPENINGS. PATCH OPENINGS TO MATCH ADJACENT SURFACES. PATCH OPENINGS IN FIRE RATED ASSEMBLIES WITH MATERIAL, CAPABLE OF PREVENTING THE PASSAGE OF FIRE AND SMOKE.
- M. ANY FIREPROOFING OF STRUCTURAL ELEMENTS, DISTURBED BY REMOVALS, SHALL BE REPAIRED. RATING OF REPAIRED FIREPROOFING SHALL EQUAL OR EXCEED RATING OF THE ADJACENT FIREPROOFING.
- N. ALL DEVICES, FIXTURES, EQUIPMENT, AND MATERIAL, DETERMINED BY THE OWNER TO BE "SAVAGE" SHALL REMAIN THE PROPERTY OF THE OWNER AND SHALL BE DELIVERED TO THE DESIGNATED LOCATION ON THE PREMISES. CONTRACTOR SHALL BE RESPONSIBLE FOR THE LEGAL DISPOSAL OF ALL OTHER REMOVED MATERIAL AND EQUIPMENT.

GENERAL NOTES:

- A. REFER TO ARCHITECTURAL SHEET C1.0 FOR CONSTRUCTION PHASING PLAN AND INFORMATION



ELECTRICAL REMOVAL PLAN

SCALE: 1/8" = 1'-0"

[illegible]

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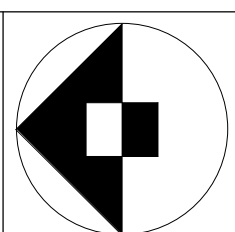
David G. Manders AIA	AI-07220
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Ronald P. Portadin AIA	AI-13038
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Project

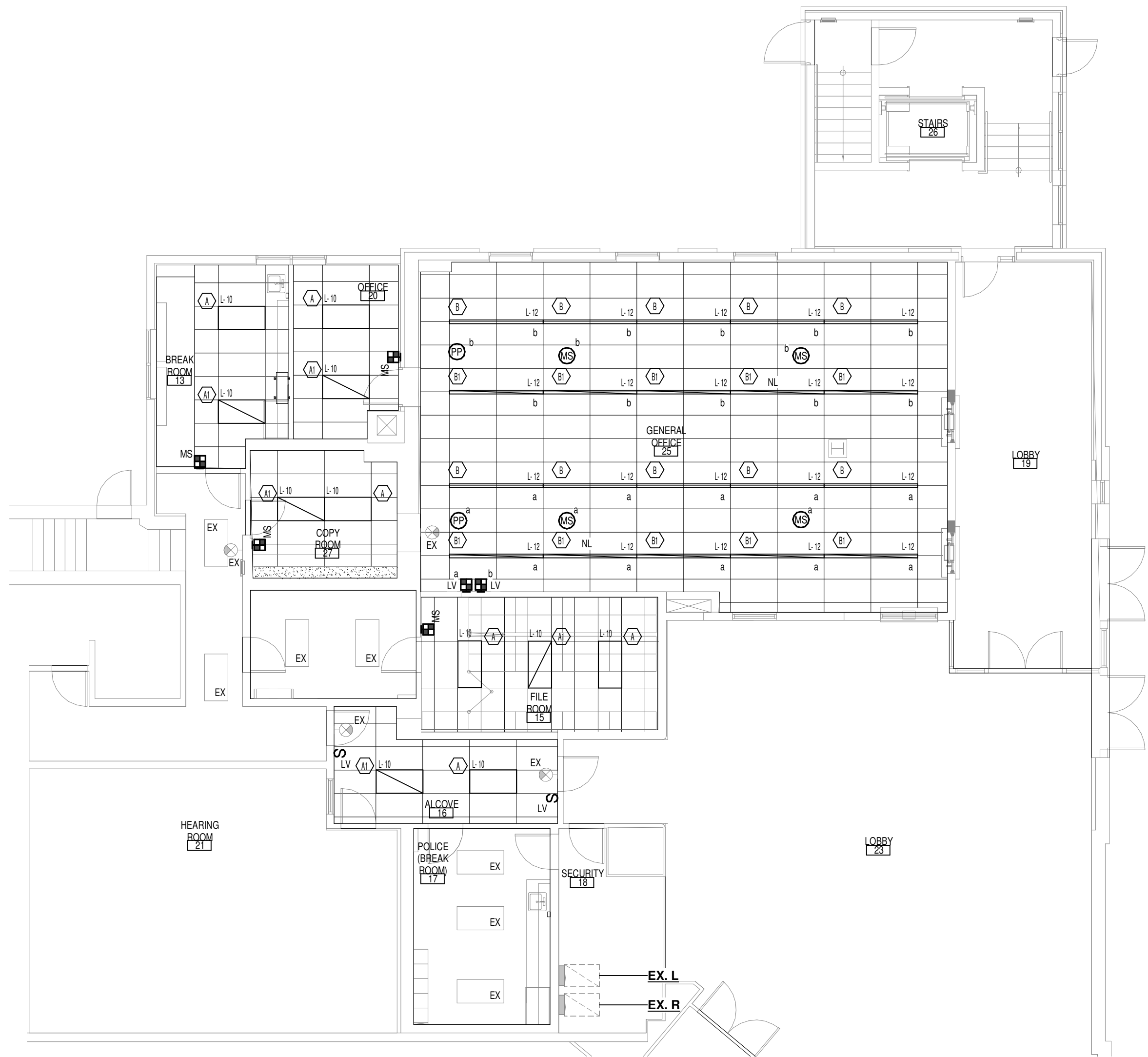
VINELAND MUNICIPAL COURT RENOVATIONS

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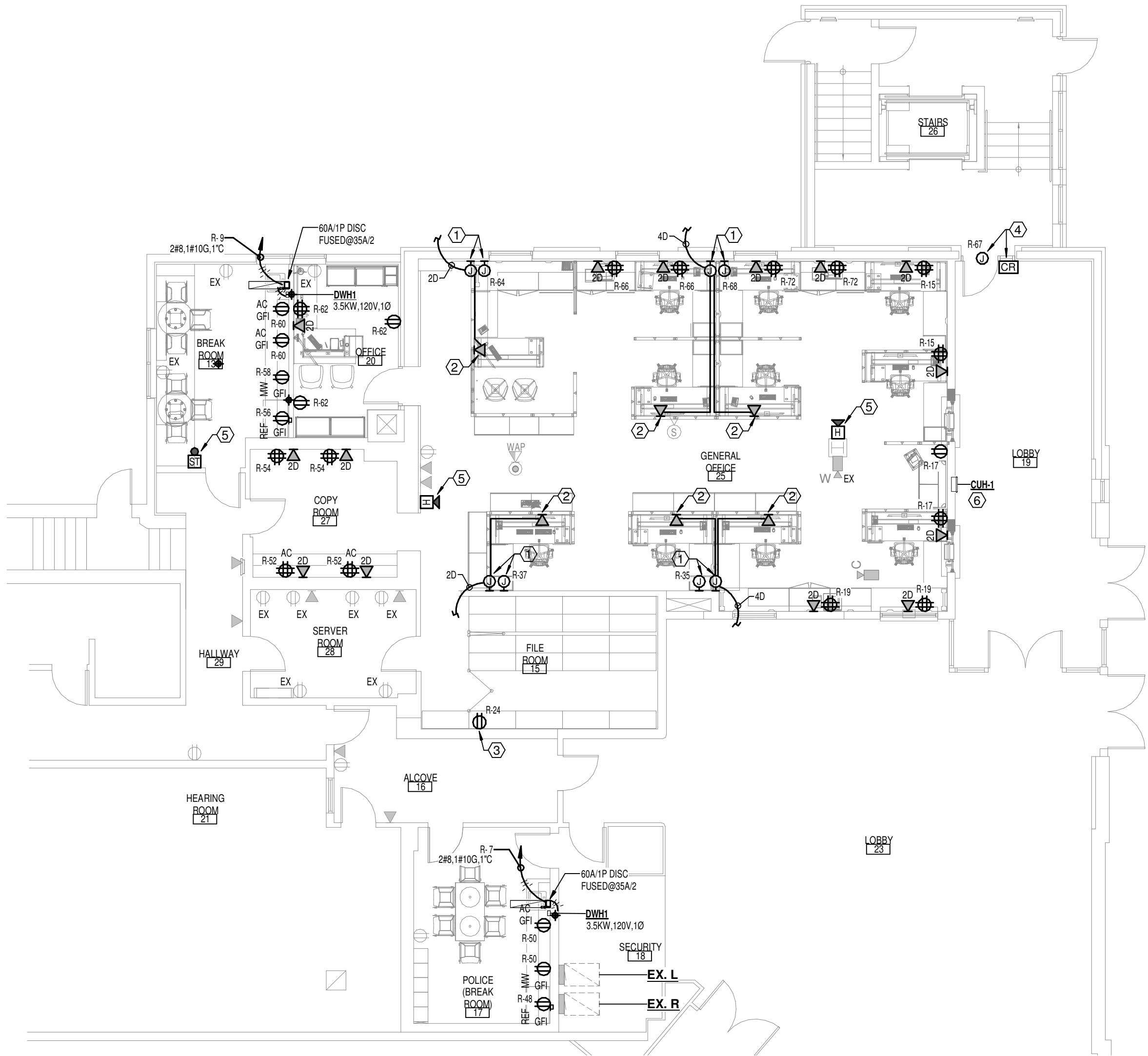
Drawing

ELECTRICAL LEGEND
REMOVAL PLAN

Scale As indicated	Job 22.019	Sheet E0.1
Drawn Author	Date 8/1/2025	



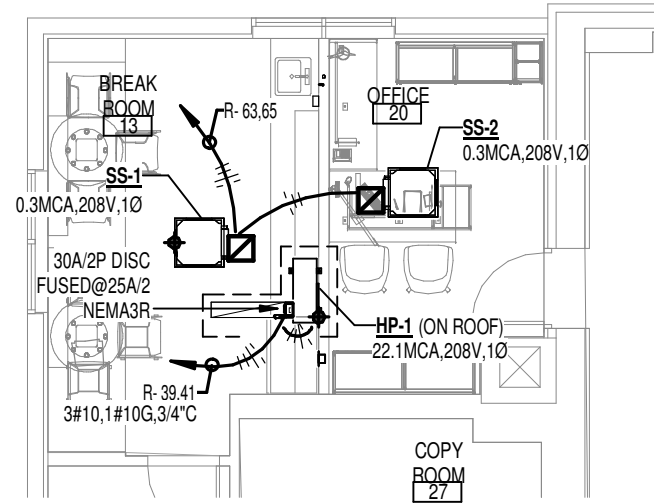
1 FIRST FLOOR LIGHTING PLAN
SCALE: 1/8" = 1'-0"



2 FIRST FLOOR POWER & SYSTEMS PLAN
SCALE: 1/8" = 1'-0"

SHEET NOTES:

1. THE CONTRACTOR SHALL PROVIDE A 4X4 OUTLET BOX IN WALL FOR BOTH THE POWER AND DATA FEEDS TO THE FURNITURE. PROVIDE 1/4"X2" FOR DATA STUBBED UP TO ACCESSIBLE CEILING. POWER CONNECTION SHALL BE THROUGH A SYSTEMS FURNITURE POWER WAMP. THE DATA FEED OUTLET BOX SHALL HAVE A GROMMETED HOLE IN THE FACEPLATE THROUGH WHICH THE DATA CABLES WILL PASS FROM THE BOX TO THE FURNITURE. THESE CABLES SHALL BE HIDDEN IN BLACK PVC.
2. VERIFY EXACT LOCATION OF DATA ACCESS LOCATION WITH FURNITURE PROVIDER BEFORE ROUGH-IN.
3. OUTLET FOR COFD AND PLUG POWER ATTACHMENT OF FILING SYSTEM. INSTALL 8" ABOVE FILING SYSTEM CABINET 8'-0" TO CENTER. VERIFY LOCATION WITH SYSTEM INSTALLER BEFORE ROUGH-IN.
4. RELOCATED ACCESS CONTROL CARD READER AND ELECTRIC STRIKE. PROVIDE ALL REQUIRED WIRING AND CABLEING TO CONNECT TO EXISTING SYSTEM.
5. RELOCATED EXISTING FIRE ALARM DEVICE. USE SAME WIRE TYPE AND SIZE AS EXISTING AND RECONNECT TO EXISTING FIRE ALARM SYSTEM.
6. EXTEND/MODIFY CIRCUIT FROM EXISTING 4W/30W/10 UNIT HEATER TO SERVE NEW UNIT.



4 FIRST FLOOR MECHANICAL POWER PLAN
SCALE: 1/8" = 1'-0"

Branch Panel: L (EXISTING)

Location: SECURITY 18
Supply From:
Mounting: Surface
Enclosure:

Volts: 120/208 Wye
Phases: 3
Wires: 4
A.I.C. Rating:

Mains Type: Main Lugs Only
Mains Rating: 100 A

Notes:

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	LTS	20 A	1	0 VA	0 VA					2	20 A	EXTERIOR LTS	2
3	LTS	20 A	1			0 VA	0 VA			--	--		4
5	LTS	20 A	1					0 VA	0 VA	1	20 A	EXTERIOR LTS	6
7	LTS	20 A	1	0 VA	0 VA					1	20 A	EMER & EXIT LTS	8
9	LTS	20 A	1			0 VA	385 VA			1	20 A	Lighting	10
11	LTS	20 A	1					0 VA	360 VA	1	20 A	Lighting	12
13	LTS	20 A	1	0 VA	0 VA					1	20 A		14
15	LTS	20 A	1			0 VA	0 VA			1	20 A		16
17	LTS	20 A	1					0 VA	0 VA	1	20 A		18
19	LTS	20 A	1	0 VA	0 VA					1	20 A		20
21	LTS	20 A	1			0 VA	0 VA			1	20 A		22
23	LTS	20 A	1					0 VA	0 VA	1	20 A		24
25	LTS	20 A	1	0 VA	0 VA					1	20 A		26
27	LTS	20 A	1			0 VA	0 VA			1	20 A		28
29		20 A	1					0 VA	0 VA	1	20 A		30
Total Load:				0 VA		385 VA		360 VA					
Total Amps:				0 A		4 A		3 A					

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
Lighting	745 VA	100.00%	745 VA	
				Total Conn. Load: 745 VA
				Total Est. Demand: 745 VA
				Total Conn. Current: 2 A
				Total Est. Demand Current: 2 A

Notes:

Branch Panel: R (EXISTING)

Location: SECURITY 18
Supply From:
Mounting: Surface
Enclosure:

Volts: 120/208 Wye
Phases: 3
Wires: 4
A.I.C. Rating:

Mains Type: Main Lugs Only
Mains Rating: 225 A

Notes:

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT	
1	ELEV MR	20 A	1	0 VA	0 VA		1	20 A	RECEPT	2	
3	ELEV CONTROLLER	20 A	1		0 VA		1	20 A	RECEPT	4	
5	ELEV PIT	20 A	1			0 VA	0 VA	1	20 A	RECEPT	6
7	DWH1	35 A	1	3500 VA	0 VA		1	20 A	RECEPT	8	
9	DWH1	35 A	1		3500 VA	0 VA	1	20 A	RECEPT	10	
11	AC-1	15 A	2			0 VA	0 VA	1	20 A	RECEPT	12
13	--	--	--	0 VA	0 VA			1	20 A	RECEPT	14
15	Receptacle	20 A	1		800 VA	0 VA	1	20 A	RECEPT	16	
17	Receptacle	20 A	1			600 VA	0 VA	1	20 A	RECEPT	18
19	Receptacle	20 A	1	800 VA	0 VA		1	20 A	RECEPT	20	
21	COMP ROOM	20 A	1		0 VA	0 VA	1	20 A	RECEPT	22	
23	COMP ROOM	20 A	1			0 VA	200 VA	1	20 A	FILING SYSTEM - FILE RM	24
25	DOOR OPERATOR	20 A	1	0 VA	0 VA		1	20 A	RECEPT	26	
27	CAMERAS	20 A	1		0 VA	0 VA	1	20 A	RECEPT	28	
29	MONITORS	20 A	1			0 VA	0 VA	1	20 A	RECEPT	30
31	MONITORS	20 A	1	0 VA	0 VA		1	20 A	RECEPT	32	
33	DOOR RELEASES	20 A	1		0 VA	0 VA	1	20 A	ROOF RECEPT	34	
35	Receptacle	20 A	1			200 VA	0 VA	1	20 A	RECEPT	36
37	Receptacle	20 A	1	200 VA	0 VA		1	20 A	RECEPT	38	
39	HP-1	25 A	2		2300 VA	0 VA	1	20 A	RECEPT	40	
41	--	--	--			2300 VA	0 VA	1	20 A	RECEPT	42
43	RECEPT	20 A	1	0 VA	0 VA		1	20 A	RECEPT	44	
45	RECEPT	20 A	1		0 VA	0 VA	1	20 A	RECEPT	46	
47	RECEPT	20 A	1			0 VA	960 VA	1	20 A	REFRIGERATOR - POLICE BR RM	48
49	RECEPT	20 A	1	0 VA	1400 VA		1	20 A	Receptacle	50	
51	RECEPT	20 A	1		0 VA	800 VA	1	20 A	Receptacle	52	
53	RECEPT	20 A	1			0 VA	800 VA	1	20 A	Receptacle	54
55	RECEPT	20 A	1	0 VA	960 VA		1	20 A	Receptacle	56	
57	RECEPT	20 A	1		0 VA	1200 VA	1	20 A	Receptacle	58	
59	RECEPT	20 A	1			0 VA	400 VA	1	20 A	Receptacle	60
61	MOV DOOR	20 A	1	0 VA	800 VA		1	20 A	Receptacle	62	
63	SS1&SS2	20 A	2		0 VA	200 VA	1	20 A	Receptacle	64	
65	--	--	--			0 VA	800 VA	1	20 A	Receptacle	66
67	Receptacle	20 A	1	200 VA	200 VA		1	20 A	Receptacle	68	
69		20 A	1		0 VA	0 VA	1	20 A	RECEPT	70	
71		20 A	1			0 VA	800 VA	1	20 A	Receptacle	72
Total Load:				8060 VA	8800 VA	7060 VA					
Total Amps:				68 A	75 A	58 A					

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
Equipment	7000 VA	100.00%	7000 VA	
HVAC	4600 VA	100.00%	4600 VA	Total Conn. Load: 23920 VA
Other	0 VA	0.00%	0 VA	Total Est. Demand: 22760 VA
Receptacle	12320 VA	90.58%	11160 VA	Total Conn. Current: 66 A
				Total Est. Demand Current: 63 A

Notes:

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	SERIES	LAMP			BALLAST / DRIVER	VOLTAGE	MOUNTING
				TYPE	NO.	WATTS			
A	2x4 LED FLAT PANEL WITH NARROW ALUMINUM TRIM/FRAME, SEAMLESS CORNERS, AND WHITE FROSTED SMOOTH ACRYLIC SCRATCH & IMPACT RESISTANT LENS.	LITHONIA	CPX-2X4-4000LM-80CRI-35K-SWL-MINI-ZT-MVOLT	LED	--	4000	36.7	0-10V, DIMMING TO 1%	RECESSED
A1	SAME AS TYPE 'A' EXCEPT WITH EMERGENCY BATTERY PACK.	LITHONIA	CPX-2X4-4000LM-80CRI-35K-SWL-MINI-ZT-MVOLT	LED	--	4000	36.7	0-10V, DIMMING TO 1%	RECESSED
B	LINEAR LED CABLE HUNG FIXTURE. FINISH TO BE SELECTED BY OWNER/ARCHITECT.	LUMENWERX	VIA2P-DI-LGO-NA-WI02-SW-80-350-200-35-8FT-UNV-D1-1-C-ACC-W-PCW	LED		4400	36	0-10V, DIMMING TO 1%	8' A.F.F. TO BOTTOM
B1	SAME AS TYPE 'B' EXCEPT WITH EMERGENCY BATTERY PACK.	LUMENWERX	VIA2P-DI-LGO-NA-WI02-SW-80-350-200-35-8FT-UNV-D1-1-C-1EMBA-CC-W-PCW	LED		4400	36	0-10V, DIMMING TO 1%	8' A.F.F. TO BOTTOM

REVISIONS

No.	Date	Description



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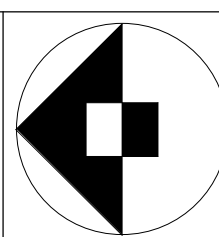
Project

VINELAND MUNICIPAL COURT RENOVATIONS

736 E LANDIS AVE
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Drawing

ELECTRICAL NEW WORK PLANS



Scale
1/8" = 1'-0"

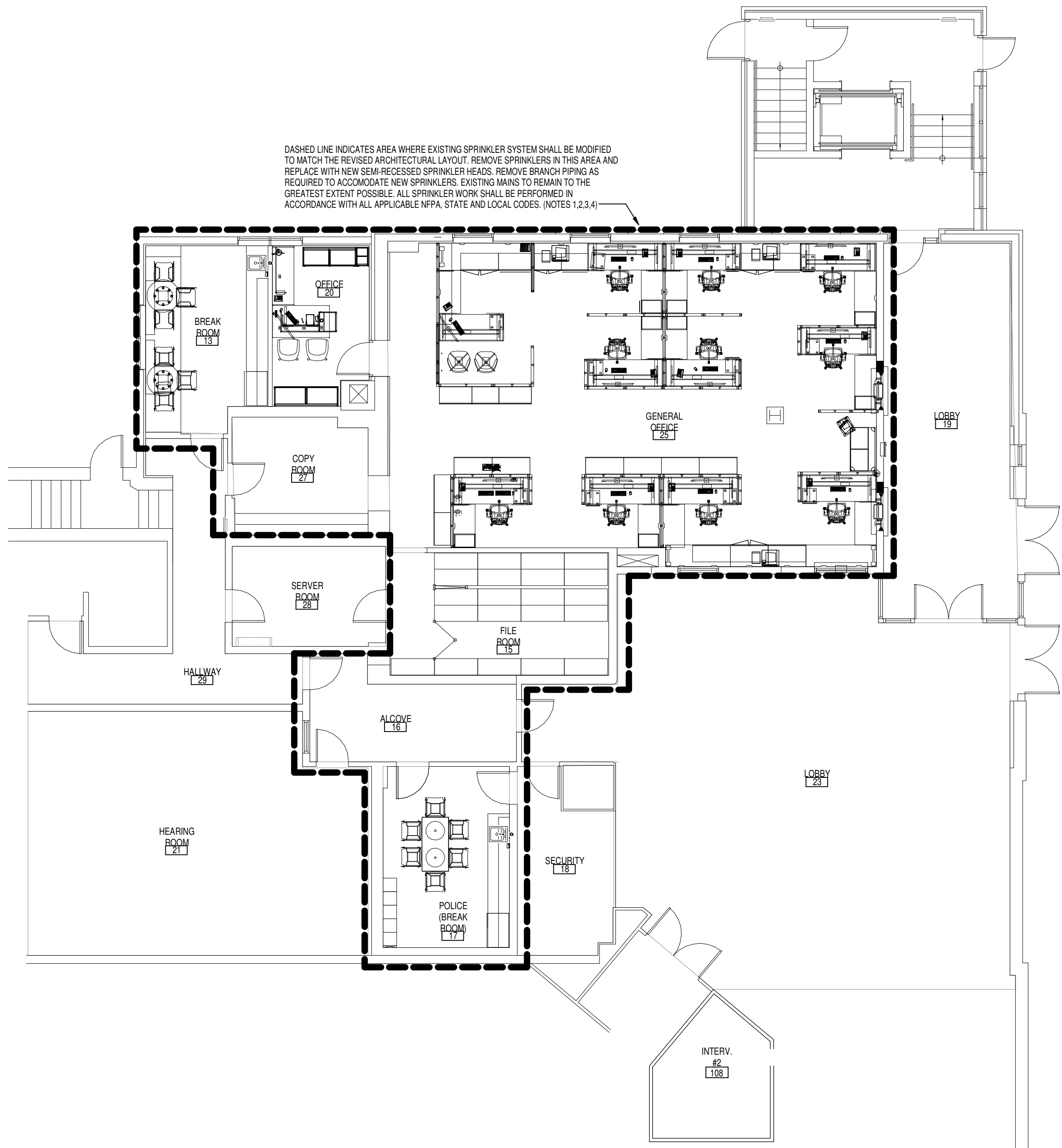
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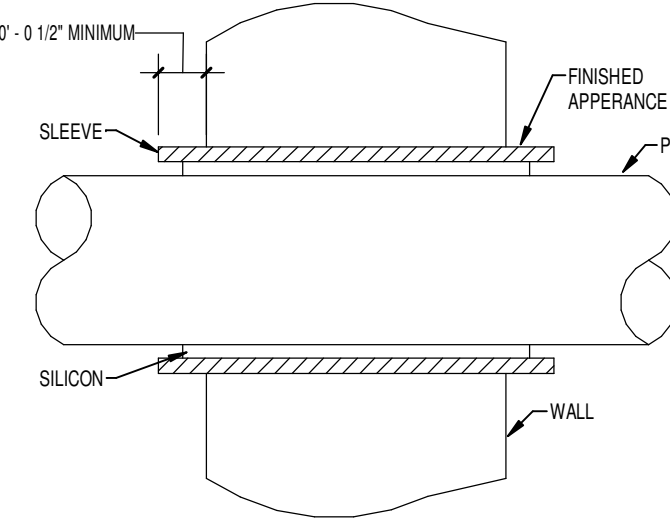
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Drawn
Author

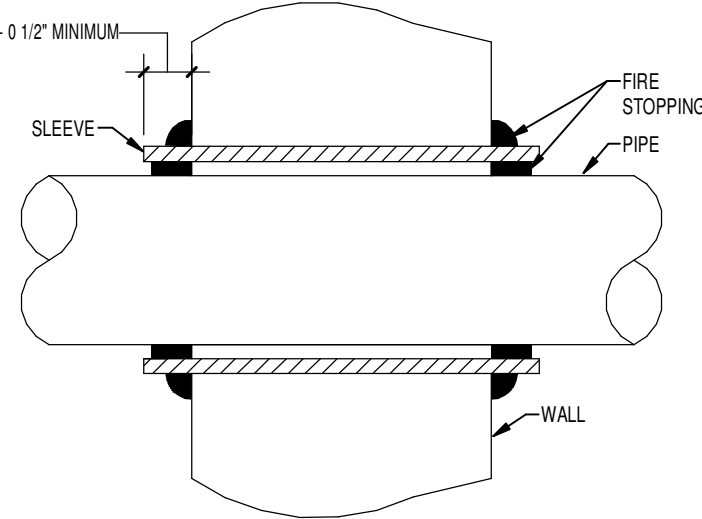
Date
8/1/2025



1 FIRST FLOOR FIRE PROTECTION PLAN
SCALE: 1/8" = 1'-0"

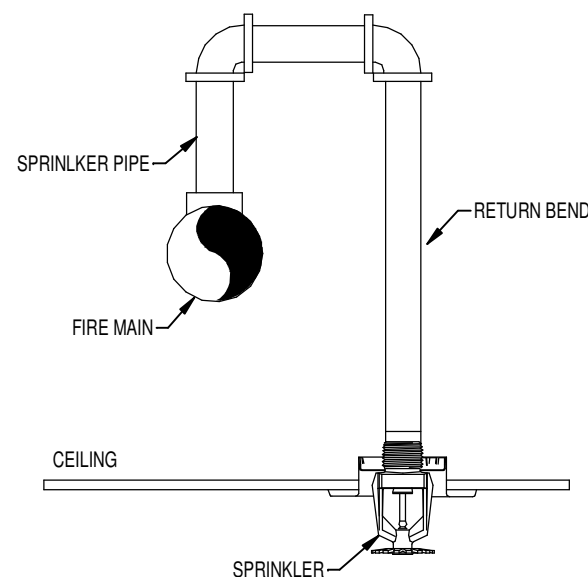


INTERIOR NON-RATED WALL SLEEVE DETAIL



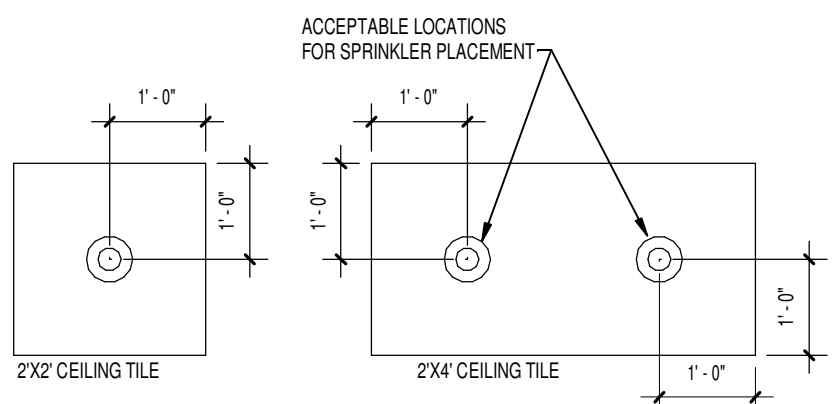
INTERIOR RATED WALL PIPE SLEEVE DETAIL

NOTE: REFER TO ARCHITECTURAL PLANS FOR LOCATIONS

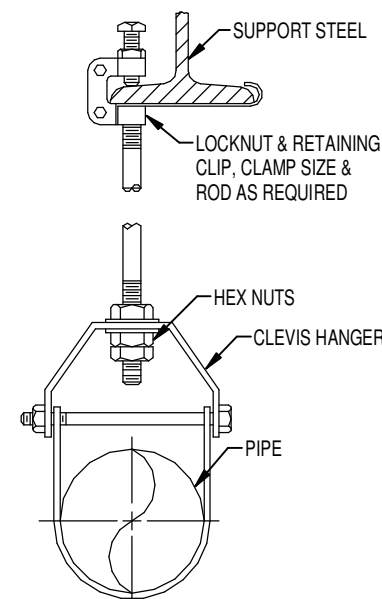


5 RETURN BEND DETAIL
SCALE: NONE

4 PIPE SLEEVE DETAIL
SCALE: NONE



6 SPRINKLER HEAD PLACEMENT
SCALE: NONE



DESIGN LOAD = IN ACCORDANCE WITH NFPA13

7 UNINSULATED PIPE SUPPORT DETAIL
SCALE: NONE

GENERAL NOTES:

APPLIES TO ALL SHEETS

- PROVIDE RECORD FLOW TEST PRIOR TO PREPARING SHOP DRAWINGS AND HYDRAULIC CALCULATIONS. CONTRACTOR SHALL PROVIDE THE FIRE SUPPRESSION DESIGN CRITERIA FORM AS PART OF THEIR STATE SUBMITTAL.
- COORDINATE INSTALLATION OF ALL SYSTEMS WITH MECHANICAL (HVAC), PLUMBING, AND ELECTRICAL SYSTEMS. CEILING CAVITY SPACE IS RESTRICTED AND INSTALLATION OF DUCTWORK SHALL TAKE PRIORITY OVER ALL OTHER TRADES. NO EXTRA COMPENSATION WILL BE ALLOWED TO COVER THE COST OF RELOCATING SYSTEMS FOUND ENCRoACHING ON SPACE REQUIRED BY MECHANICAL, PLUMBING, OR ELECTRICAL SYSTEMS.
- PROVIDE SPRINKLERS ABOVE AND BELOW WIDE DUCTS (48" AND WIDER INCLUDING INSULATION) PER NFPA 13 REQUIREMENTS. REFER TO HVAC DRAWINGS FOR ADDITIONAL INFORMATION.
- EXACT ROUTING OF PIPING AND FINAL SIZING AND LOCATION OF SPRINKLERS SHALL BE SELECTED BY THE CONTRACTOR TO ACCOUNT FOR ACTUAL FIELD CONDITIONS. ALL AREAS SHALL BE PROTECTED UNLESS SPECIFICALLY NOTED OTHERWISE. COORDINATE INSTALLATION WITH CEILING HEIGHTS AND SOFFITS. REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL INFORMATION.
- EXTENDED COVERAGE SPRINKLERS MAY BE UTILIZED. THE USE OF EXTENDED COVERAGE SHALL BE CONFIRMED BY HYDRAULIC CALCULATIONS.
- PIPING SHALL BE CONCEALED IN ALL FINISHED AREAS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ASSOCIATED FEES.
- THIS BUILDING SHALL BE CONSIDERED LIGHT/ORDINARY HAZARD OCCUPANCY WITH EXCEPTIONS PER NFPA 13, STATE, AND LOCAL CODES. DESIGN DENSITIES SHALL BE IN ACCORDANCE WITH THE OWNER'S INSURANCE UNDERWRITER.
- INSTALL SPRINKLER PIPING AS HIGH AS POSSIBLE IN CEILING CAVITIES. SOME BRANCH LINES WILL REQUIRE ARM OVERS TO SUPPLY SPRINKLERS BELOW DUCTWORK. REFER TO MECHANICAL DRAWINGS AND COORDINATE WITH THE MECHANICAL CONTRACTOR.
- SPRINKLER PIPING SHALL BE SCHEDULE 10 STEEL FOR PIPING THAT IS 2-1/2" OR LARGER, PROVIDE SCHEDULE 40 STEEL PIPING FOR 2" AND SMALLER UNLESS OTHERWISE NOTED. THINWALL, LIGHTWALL, PRO-PRESS TYPE PIPING/FITTINGS WILL NOT BE ALLOWED.
- PROVIDE PIPE LABELS FOR ALL SPRINKLER PIPING. LABELS SHALL READ "FIRE PROTECTION PIPING".
- PAINT ALL SPRINKLER PIPING THAT IS EXPOSED IN PUBLIC SPACES. COORDINATE WITH ALL TRADES. COLOR TO BE SELECTED BY OWNER/ARCHITECT.

FIRE PROTECTION NOTES:

- CONTRACTOR MAY RE-USE EXISTING SPRINKLER PIPING UNLESS THE EXISTING SPRINKLER PIPING IS FOUND TO BE ENCRoACHING ON SPACE REQUIRED BY OTHER DISCIPLINES IN WHICH CASE THE EXISTING SYSTEM PIPING SHALL BE REMOVED TO MAKE ROOM FOR MECHANICAL (DUCTWORK), PLUMBING AND ELECTRICAL SYSTEMS INSTALLATION.
- CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING/UPGRADING ANY EXISTING PIPING IN THIS AREA AS REQUIRED TO INSTALL NEW SPRINKLERS IN THE RENOVATED SPACE.
- EXISTING SPRINKLER SYSTEMS OUTSIDE THE LIMITS OF THIS PROJECT SHALL REMAIN ACTIVE AT ALL TIMES. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL NECESSARY TEMPORARY CONNECTIONS. IF SHUT-DOWN IS REQUIRED REFER TO NOTE 4.
- ANY REQUIRED SPRINKLER SYSTEM SHUT-DOWN SHALL BE COORDINATED WITH THE OWNER. CONTRACTOR SHALL PROVIDE OWNER WITH AT LEAST ONE WEEK NOTICE PRIOR TO SHUTDOWN. IN AREAS IMPACTED BY THE SHUT-DOWN, THE CONTRACTOR SHALL BE REQUIRED TO PERFORM FIRE-WATCHES 24 HOURS A DAY UNTIL REVISED SYSTEM IS BROUGHT BACK ON-LINE AND CERTIFIED BY THE LOCAL INSPECTOR OR PROVIDE UPRIGHT SPRINKLERS PER ALL APPLICABLE NFPA, STATE AND LOCAL CODES. THE SPRINKLER SYSTEM SHALL BE ON-LINE AT THE END OF EACH DAY WHEN THE CONTRACTOR LEAVES THIS SITE. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH SHUTDOWNS AND TIE-INS.

REVISIONS

No.	Date	Description



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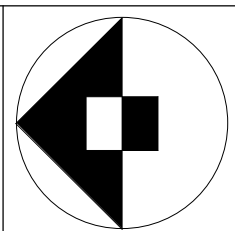
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VINELAND MUNICIPAL COURT RENOVATIONS

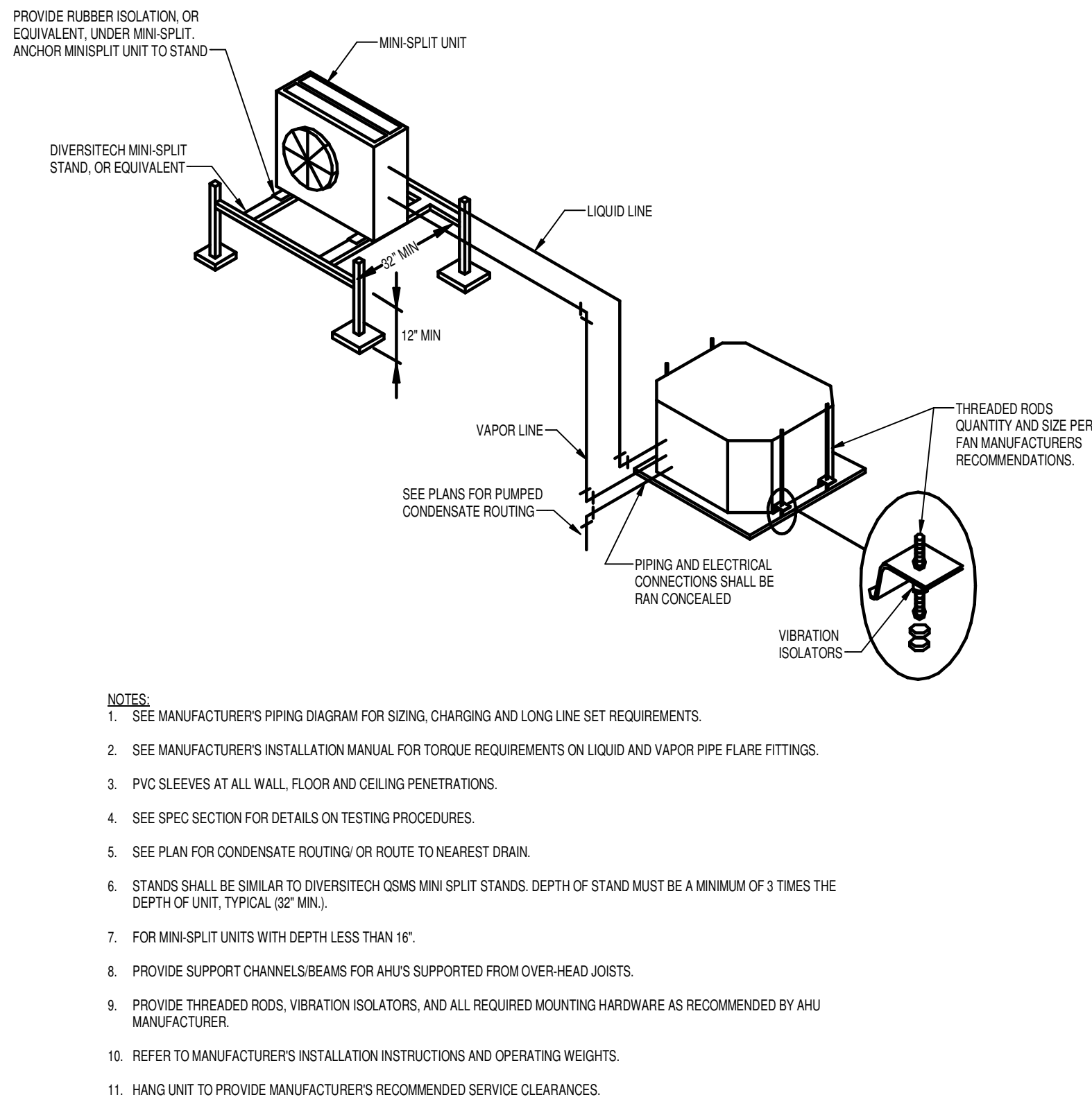
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Drawing

FIRE PROTECTION PLAN

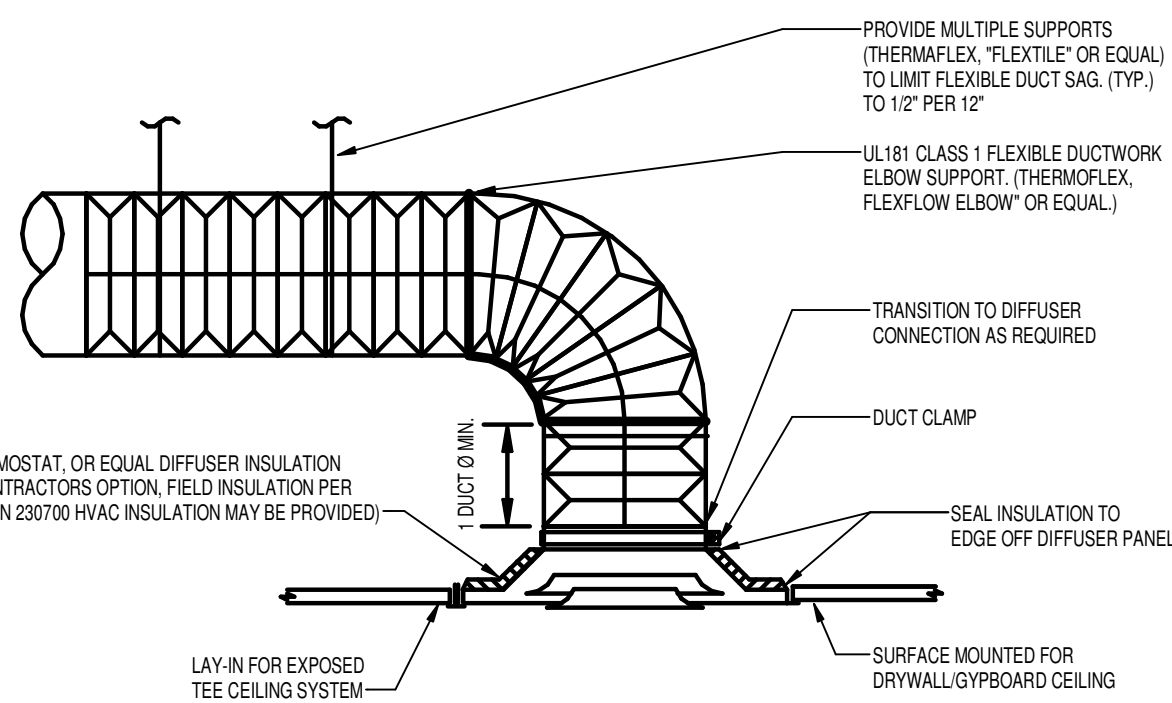


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As indicated	22.019	
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MRS	8/1/2025	



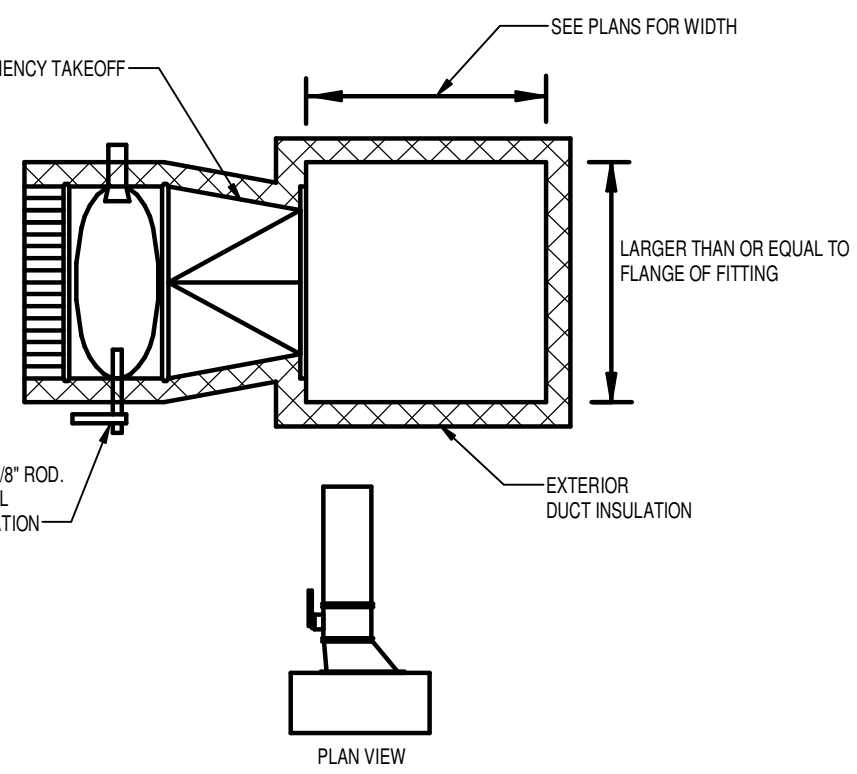
MINISPLIT/HEAT PUMP PIPING (STAND)

SCALE: NONE



SUPPLY DIFFUSER CONNECTION DETAIL

SCALE: NONE



VOLUME DAMPER TAPERED FITTING W/ DAMPER DETAIL

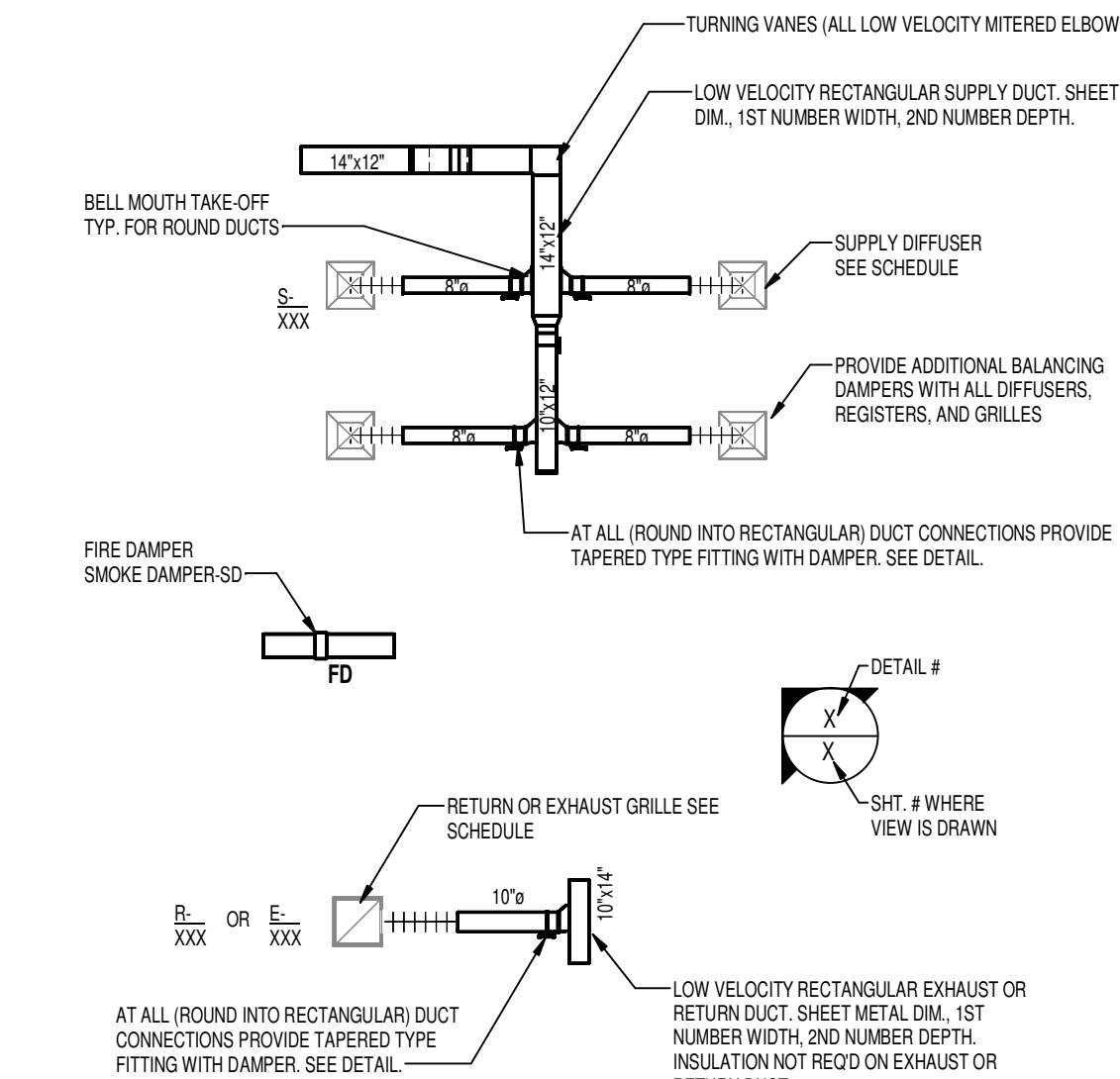
SCALE: NONE

HVAC SYMBOLS AND ABBREVIATIONS LEGEND

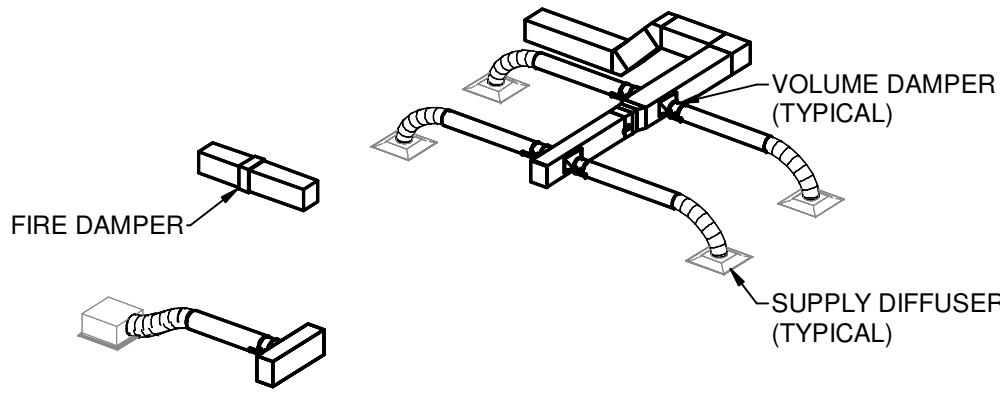
SYMBOLS

- AUTOMATIC DAMPER (MOTOR OPERATED)
- MANUAL DAMPER
- MANUAL AIR VENT
- ADJUSTABLE ROOM THERMOSTAT
- HATCHING DENOTES ITEMS TO BE REMOVED
- POINT OF CONNECTION - PROJECT INSTALLED TO EXISTING

- E.A. EXHAUST AIR
- O.A. OUTSIDE AIR
- S.A. SUPPLY AIR
- R.A. RETURN AIR
- CAP. CAPACITY
- TEMP. TEMPERATURE
- MIN. MINIMUM
- MAX. MAXIMUM
- EX EXISTING
- AHU AIR HANDLING UNIT
- BTUH BTUH
- A.F.F. ABOVE FINISHED FLOOR
- EF EXHAUST FAN
- TYP. TYPICAL
- CONN. CONNECTION
- FD FIRE DAMPER
- FSD FIRE SMOKE DAMPER
- HTR HEATER
- T.C. TEMPERATURE CONTROL
- DN. DOWN
- MECH. MECHANICAL
- RM ROOM
- S.P. STATIC PRESSURE
- REF. REFERENCE
- EAT ENTERING AIR TEMPERATURE
- LAT LEAVING AIR TEMPERATURE
- UH UNIT HEATER
- MAV MANUAL AIR VENT
- SP SETPOINT



PLAN VIEW



ISOMETRIC VIEW

HVAC DUCT LEGEND

SCALE: NONE

NOTES:

- ALL DUCTWORK DIMENSIONS ARE EXTERIOR DIMENSIONS OF DUCT.
- ALL MEDIUM PRESSURE TAKEOFFS TO HAVE 45° LATERAL OR SIMILAR EVEN IF NOT SPECIFICALLY SHOWN IN DRAWINGS.
- PROVIDE WITH DISCONNECT SWITCH, THERMOSTAT, RELAYS, AND ALL ACCESSORIES FOR SINGLE POINT OF ELECTRIC CONNECTION UTILIZATION.
- SHOP DRAWINGS MUST INCLUDE PERFORMANCE DATA OR THEY WILL BE REJECTED.

SCHEDULE OF ELECTRIC CABINET HEATER

SCHEDULE OF ELECTRIC CABINET HEATER								
NOTES: 1. COLOR AS SELECTED BY ARCHITECT FROM CLASSIC ORORA COLOR OPTIONS. 2. CONTRACTOR TO FIELD VERIFY LENGTH OF MOUNTING WALL WITH SHOP DRAWING SUBMITTAL. 3. PROVIDE WITH DISCONNECT SWITCH, THERMOSTAT, RELAYS, AND ALL ACCESSORIES FOR SINGLE POINT OF ELECTRIC CONNECTION UTILIZATION. 4. SHOP DRAWINGS MUST INCLUDE PERFORMANCE DATA OR THEY WILL BE REJECTED.								
MARK	MANUFACTURER	MODEL No.	HEATING CAPACITY	WATTS	ELECTRICAL CHARACTERISTICS		MOUNTING	NOTES
CUH-1	STELPRO	AWFA4008TW	13651.0 Btu/h	4000 W	VOLTAGE	PHASE	WALL	ALL

SCHEDULE OF DUAL PORT HEAT PUMP

SCHEDULE OF DUAL PORT HEAT PUMP								
NOTES: 1. DIVISION 26 SHALL PROVIDE DISCONNECT SWITCH. 2. PROVIDE SINGLE POINT WIRING KIT AND ALL DAMPERS, SENSORS, AND CONTROL COMPONENTS AS REQUIRED FOR SEQUENCE OF OPERATION INDICATED. 3. PROVIDE WITH SINGLE PHASE A/C SURGE PROTECTOR (120/240V), MOUNT TO LINE SIDE OF DISCONNECT. 4. SLOPE SUCTION LINE TOWARD EVAPORATOR. 5. FURNISH WITH LOW AMBIENT CONTROLS WITH NON-BLEED TXV AND MECHANICAL A/C CONDENSER ROOF SUPPORT (SIMILAR TO MIR MODEL LD). 6. REFRIGERANT LINES SHALL BE SIZED PER MANUFACTURER'S RECOMMENDATIONS WITH LONG LINE KITS AND OTHER ACCESSORIES AS REQUIRED. 7. INSTALLATION SHALL BE SUPERVISED BY A MANUFACTURER'S REPRESENTATIVE TO ENSURE PROPER OPERATION. 8. MAINTAIN 24" (MIN.) BETWEEN UNITS TO ALLOW PROPER AIRFLOW. 9. PROVIDE UNIT WITH COMMUNICATION INTERFACE. CONTRACTOR TO COORDINATE WITH TEMP CONTROL PROVIDER TO CONNECT TO BMS. 10. SHOP DRAWINGS MUST INCLUDE PERFORMANCE DATA OR THEY WILL BE REJECTED.								
MARK	MANUFACTURER	MODEL No.	CAPACITY	MINIMUM EFFICIENCY (EER/SEER)	MINIMUM STARTING AND OPERATING TEMPERATURE	ELECTRICAL CHARACTERISTICS		NOTES
HP-1	DAIKIN	MXZ-S24NA3	0.0 Btu/h	20	5 °F	VOLTAGE	PHASE	ALL

SCHEDULE OF MINI SPLIT SYSTEMS

SCHEDULE OF MINI SPLIT SYSTEMS										
NOTES: 1. FINISH SHALL BE AS DIRECTED BY ARCHITECT FROM MANUFACTURER STANDARD OPTIONS FOR MATERIALS DENOTED BY MODEL NUMBER. 2. PROVIDE WITH VOLUME DAMPER. 3. PROVIDE WITH EQOAR, ANEMOSTAT, OR EQUAL DIFFUSER INSULATION TENT AT CONTRACTORS OPTION. FIELD INSULATION PER SPEC SECTION 230700 HVAC INSULATION MAY BE PROVIDED. 4. SHOP DRAWINGS MUST INCLUDE PERFORMANCE DATA OR THEY WILL BE REJECTED.										
MARK	MANUFACTURER	MODEL No.	TOTAL COOLING CAPACITY TOTAL	HEATING CAPACITY	CFM	MIN OUTSIDE AIR CFM	SPL (dBA)	ELECTRICAL CHARACTERISTICS		NOTES
SS-1	DAIKIN	SLZ-KF12NA	12000.0 Btu/h	13000.0 Btu/h	265	0 CFM	30	VOLTAGE	PHASE	ALL
SS-2	DAIKIN	SLZ-KF12NA	12000.0 Btu/h	13000.0 Btu/h	265	0 CFM	30	VOLTAGE	PHASE	ALL

SCHEDULE OF GRILLES & DIFFUSERS

SCHEDULE OF GRILLES & DIFFUSERS											
NOTES: 1. FINISH SHALL BE AS DIRECTED BY ARCHITECT FROM MANUFACTURER STANDARD OPTIONS FOR MATERIALS DENOTED BY MODEL NUMBER. 2. PROVIDE WITH VOLUME DAMPER. 3. PROVIDE WITH EQOAR, ANEMOSTAT, OR EQUAL DIFFUSER INSULATION TENT AT CONTRACTORS OPTION. FIELD INSULATION PER SPEC SECTION 230700 HVAC INSULATION MAY BE PROVIDED. 4. SHOP DRAWINGS MUST INCLUDE PERFORMANCE DATA OR THEY WILL BE REJECTED.											
MARK	MANUFACTURER	MODEL No.	CORE TYPE	PANEL SIZE	INLET DIMENSION	NOMINAL CFM	THROW	PRESSURE DROP (IN.)	SOUND N.C.	THROWS	NOTES
R-1	TITUS	PAR	PERFORATED	24" x 24"	14" x 14"	500	0	0.09	26	0	LAY-IN ALL
S-1	TITUS	OMNI	PLAQUE	24" x 24"	6"	100	2	0.02	< 10	4	LAY-IN ALL
S-2	TITUS	OMNI	PLAQUE	24" x 24"	8"	220	4	0.04	< 10	4	LAY-IN ALL

GENERAL REMOVAL NOTES:

- THE DRAWINGS AND EACH SPECIFICATION SECTION ARE COMPLEMENTARY, ONE TO THE OTHER, AND THAT WHICH IS SHOWN ON THE DRAWINGS OR CALLED FOR IN ANY SPECIFICATION SECTION SHALL BE AS BINDING AS IF IT WERE SHOWN ON ALL DRAWINGS AND CALLED FOR IN EACH SPECIFICATION SECTION.
- THE REMOVAL DRAWINGS SHALL SERVE TO AID THE CONTRACTOR IN THE EVALUATION OF THE EXTENT OF REMOVALS, BUT SHALL NOT BE HELD TO BE ALL INCLUSIVE.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR VISITING THE AREA TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS, VERIFY SIZE, LOCATION, AND USAGE OF EXISTING UTILITIES PRIOR TO REMOVAL. FOR FURTHER INFORMATION WITH REGARD TO THE EXTENT OF REMOVALS, SEE THE CONSTRUCTION DRAWINGS AND THE ARCHITECTURAL DRAWINGS WHICH SHOW WORK TO BE PERFORMED.
- OWNER SHALL BE GIVEN FIRST CHOICE ON ALL EQUIPMENT BEING REMOVED THAT WILL NOT BE RELOCATED. CONTRACTOR SHALL REVIEW THE EXISTING EQUIPMENT WITH OWNER. EQUIPMENT BEING REMOVED OR RELOCATED SHALL BE REMOVED IN A MANNER THAT REUSE IS POSSIBLE AND STORED AS DIRECTED BY OWNER. ALL OTHER EQUIPMENT SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED & DISPOSED OF FROM THE SITE BY THE CONTRACTOR.
- CUT, PATCH & REPAIR ALL OPENINGS IN WALLS, FLOORS, CEILINGS, ETC. WHERE REQUIRED BY THE REMOVAL OF EQUIPMENT, DUCTWORK, AND ACCESSORIES. PATCHING SHALL MATCH EXISTING CONSTRUCTION & FINISHES. COORDINATE ALL PATCHING AND FINISHES WITH ARCHITECT. PATCHING OF FIRE WALLS SHALL MEET THE RATING AND SHALL BE INSTALLED PER ARCHITECTURAL SPECIFICATION.
- IF EQUIPMENT TO REMAIN MUST BE REMOVED DUE TO REMOVAL OR CONSTRUCTION, THE EQUIPMENT SHALL BE RELOCATED IN A MANNER THAT IS ACCEPTABLE BY THE ARCHITECT/ENGINEER.
- PROPER CONNECTIONS, MATERIALS, AND SIZES OF DUCTWORK/PIPING SHALL BE MAINTAINED TO ENSURE EQUIPMENT IS MADE FULLY OPERATIONAL.
- REMOVAL OF EXISTING EQUIPMENT SHALL BE MADE SO THAT SERVICE TO OTHER AREAS UTILIZED BY THE OWNER ARE NOT INTERRUPTED WITHOUT CONSENT FROM OWNER. PROVIDE TEMPORARY VALVES AND TEMPORARY SERVICES REQUIRED DURING REMOVALS AND CONSTRUCTION.
- REMOVE COMPLETELY ALL EXISTING HVAC EQUIPMENT, ALL ASSOCIATED PIPING, CONTROLS, AND SUPPORTS BEING MADE OBSOLETE BY THIS CONSTRUCTION. REMOVAL OF HVAC DUCTWORK AND PIPING SHALL BE MADE BACK TO MAINS AS INDICATED BY THE HATCHING. WORK ASSOCIATED WITH THE MAINS SHALL BE DONE DURING OFF HOURS.
- CONTRACTOR SHALL BE RESPONSIBLE TO KEEP ALL PHASES OF CONSTRUCTION AREA UNDER A NEGATIVE MODE AND SHALL BE CERTIFIED. PROVIDE A DIGITAL PRESSURE DIFFERENTIAL MEASUREMENT WITH INDICATION TO 0.1 INCHES OF PRESSURE DIFFERENTIAL OUTSIDE THE CONSTRUCTION AREA THAT MEASURES THE PRESSURE WITHIN THE CONSTRUCTION SITE. GAUGE SHALL BE READ AND SIGNED BY THE CONTRACTOR INDICATING NEGATIVE PRESSURE IN THE CONSTRUCTION AREA. WHEN THE BUILDING AIR DISTRIBUTION SYSTEM IS USED TO MAINTAIN NEGATIVE MODE, THE CONTRACTOR SHALL PROVIDE TEMPORARY FILTER MEDIA ON ALL RETURN AND EXHAUST OPENINGS IN THE CONSTRUCTION AREA. THE FILTER MEDIA SHALL BE REPLACED WHEN DIRTY OR WHEN DIRECTED BY THE ENGINEER.

GENERAL NOTES:

- CONTRACTOR SHALL PROVIDE MANUFACTURER'S RECOMMENDED ACCESS TO ALL EQUIPMENT, TERMINAL UNITS, AND VALVES. ACCESS SHALL BE REMOVABLE CEILING TILES OR CEILING ACCESS PANELS. COORDINATE LOCATION OF MECHANICAL EQUIPMENT WITH OTHER TRADES TO AVOID CONFLICT.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR LOCATION OF GRILLES AND DIFFUSERS.
- FOR ALL WALLS THAT ARE EXTENDED TO STRUCTURE PROVIDE SLEEVES FOR PIPING AND DUCTWORK PENETRATING WALLS (REFERENCE SPECIFICATIONS).
- DRAWINGS ARE DIAGRAMMATIC. PROVIDE ADDITIONAL OFFSETS, TRANSITIONS, ETC. AS REQUIRED TO AVOID INTERFERENCE ENCOUNTERED. FULL COORDINATION DRAWINGS WITH OTHER TRADES ARE REQUIRED.
- PROVIDE FIRE DAMPERS AT ALL DUCT FLOOR PENETRATIONS NOT CONCEALED WITHIN A FIRE RATED CHASE.
- IF THE CONTRACTOR DOES NOT CLEARLY UNDERSTAND THESE PLANS OR IS NOT SURE OF THEIR MEANING, HE SHOULD OBTAIN THE ARCHITECT'S WRITTEN EXPLANATION AND INTERPRETATION PRIOR TO SUBMITTING HIS BID. SINCE THE CONTRACTORS WILL BE HELD RIGIDLY TO THE INTERPRETATION OF THE ARCHITECT.
- CUT, PATCH, REPAIR AND RESTORE TO ORIGINAL CONDITION ALL OPENINGS IN WALLS, FLOORS, CEILINGS, ETC. WHERE REQUIRED. PATCHING SHALL MATCH EXISTING CONSTRUCTION & FINISHES. COORDINATE ALL PATCHING AND FINISHES WITH ARCHITECT.
- RELOCATION OF EXISTING PIPE AND EQUIPMENT HANGERS REQUIRED FOR INSTALLATION WORK SHALL BE CONSIDERED PART OF THIS CONTRACT.
- PROVIDE BALANCING DAMPERS FOR ALL S.A., R.A., AND E.A. DUCT BRANCH TAKEOFFS AND RUNOUTS TO GRILLES, DIFFUSERS, ETC.
- USE RADIUS ELBOWS. IF SPACE ISN'T AVAILABLE, MITERED ELBOWS ARE ACCEPTABLE. PROVIDE TURNING VANES IN ALL RECTANGULAR MITERED ELBOWS, SUPPLY AND RETURN DUCTWORK.
- INSTALL FLEX DUCTS FULLY EXTENDED. DO NOT BEND DUCTS ACROSS SHARP CORNERS. BENDS OF FLEX DUCTS SHALL NOT EXCEED A MINIMUM OF 1.5 DUCT DIAMETERS. AVOID CONTACT OF FLEX DUCT WITH METAL FIXTURES, WATER LINES, PIPES, OR CONDUITS.

AIR BALANCING SCOPE:

- PREBALANCE READINGS SHALL BE TAKEN AND PROVIDED TO THE ENGINEER BEFORE REMOVAL WORK BEGINS. ALL EFFORTS TO USE THE BEST DOCUMENTED INFORMATION FOR EXISTING CONDITIONS HAVE BEEN TAKEN. HOWEVER, IF EXISTING FIELD CONDITIONS VARY FROM THE DOCUMENTS, NOTIFY THE A/E TEAM IMMEDIATELY IN WRITING. OMISSION OF THE PREBALANCE MAY LEAD TO ADDITIONAL TROUBLESHOOTING DURING FINAL BALANCING. CONTRACTOR WILL BE REQUIRED TO CORRECT DEFICIENCIES CAUSED BY FAILURE TO PERFORM SUCH VERIFICATIONS AT NO EXPENSE TO OWNER. PREBALANCE READINGS SHALL BE PERFORMED AT THE FOLLOWING LOCATIONS:
 - WITHIN THE PROJECT AREA(S); RECORD AIR FLOW READINGS AT THE DISCHARGE OF EACH EXISTING TERMINAL UNIT, EACH EXISTING GRILLE & DIFFUSER.
 - AT EQUIPMENT SERVING THE PROJECT AREA(S); EACH EXHAUST FAN CONNECTION, AND AT EACH AIR HANDLER.
 - AT DUCT MAIN CONNECTIONS SERVING THE PROJECT AREA(S); A DUCT TRAVERSE READING SHALL BE TAKEN AT THE CLOSEST TAKE-OFF OR LOCATION OF THE TIE-IN WHICH INCLUDES THE ENTIRE PROJECT AREA. ANY AIRFLOW DOWNSTREAM OF THIS POINT UTILIZED OUTSIDE OF THE PROJECT AREA SHALL BE REACHED BY THE MOST ECONOMICAL MEANS (TRAVERSE, GRILLE / DIFFUSERS, ETC.) AND DOCUMENTED.
- BALANCE ALL GRILLES AND DIFFUSERS TO THE VALUES INDICATED.
- UPON COMPLETION OF THE DUCT MODIFICATIONS, RECORD FINAL AIR FLOW RATES WITHIN THE PROJECT AREA, AT THE AIR HANDLING UNIT AND EXHAUST FANS). TOTAL AIR FLOW RATES WITHIN THE PROJECT AREA AND AT THE SOURCE EQUIPMENT SHALL BE WITHIN 5% OF EXISTING CONDITION / DESIGN FLOW RATES.

REVISIONS

No.	Date	Description



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Project

VINELAND MUNICIPAL COURT RENOVATIONS

736 E LANDIS AVE
VINELAND, NEW JERSEY 08310

Drawing

HVAC LEGEND, DETAILS, AND SCHEDULES

Scale

As indicated

Job

22.019

Sheet

M0.1

Drawn

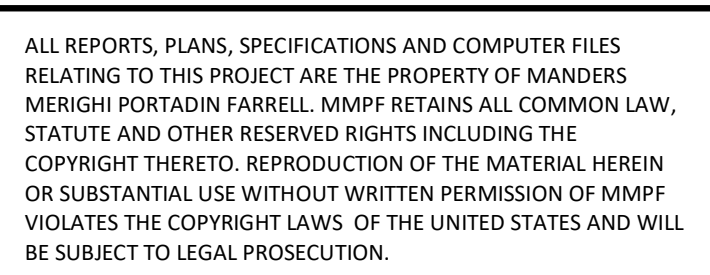
MCG

Date

8/1/2025



BCCLT
CONSULTING ENGINEERS



David G. Manders AIA	AI-07220
Lawrence J. Merighi AIA	AI-07473
Ronald P. Portadin AIA	AI-13038
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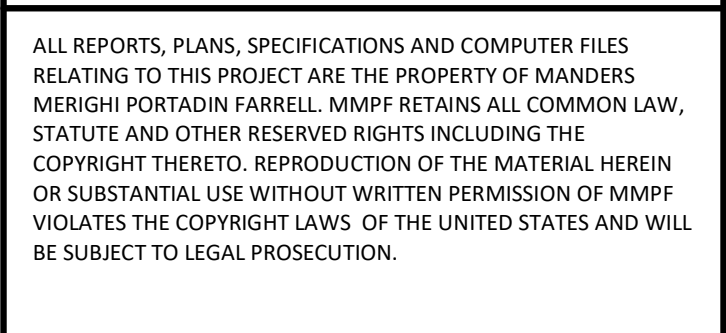
Drawing FIRST FLOOR HVAC REMOVAL PLAN	

M1.0





BCCLT
CONSULTING ENGINEERS



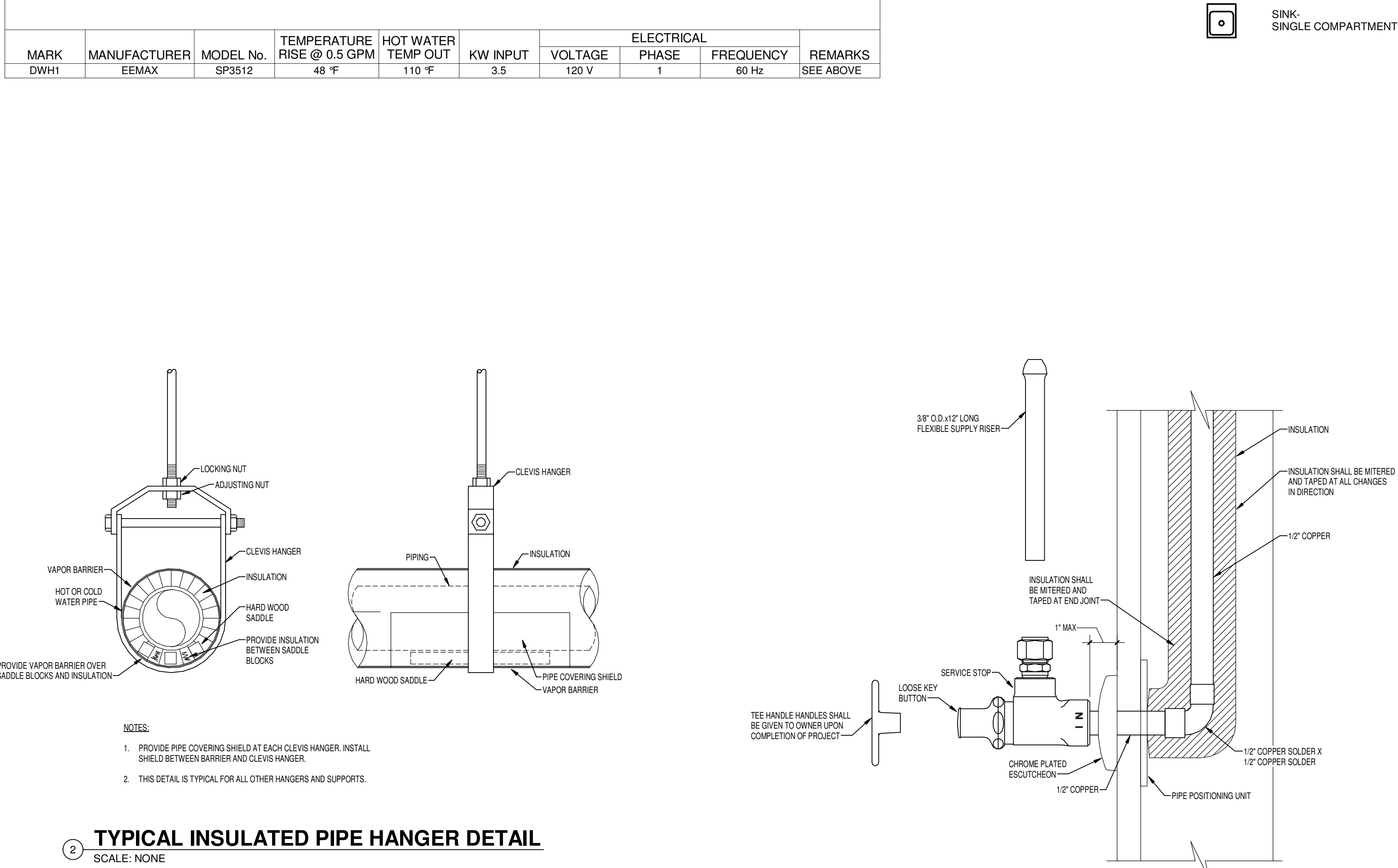
VINELAND MUNICIPAL
COURT RENOVATIONS

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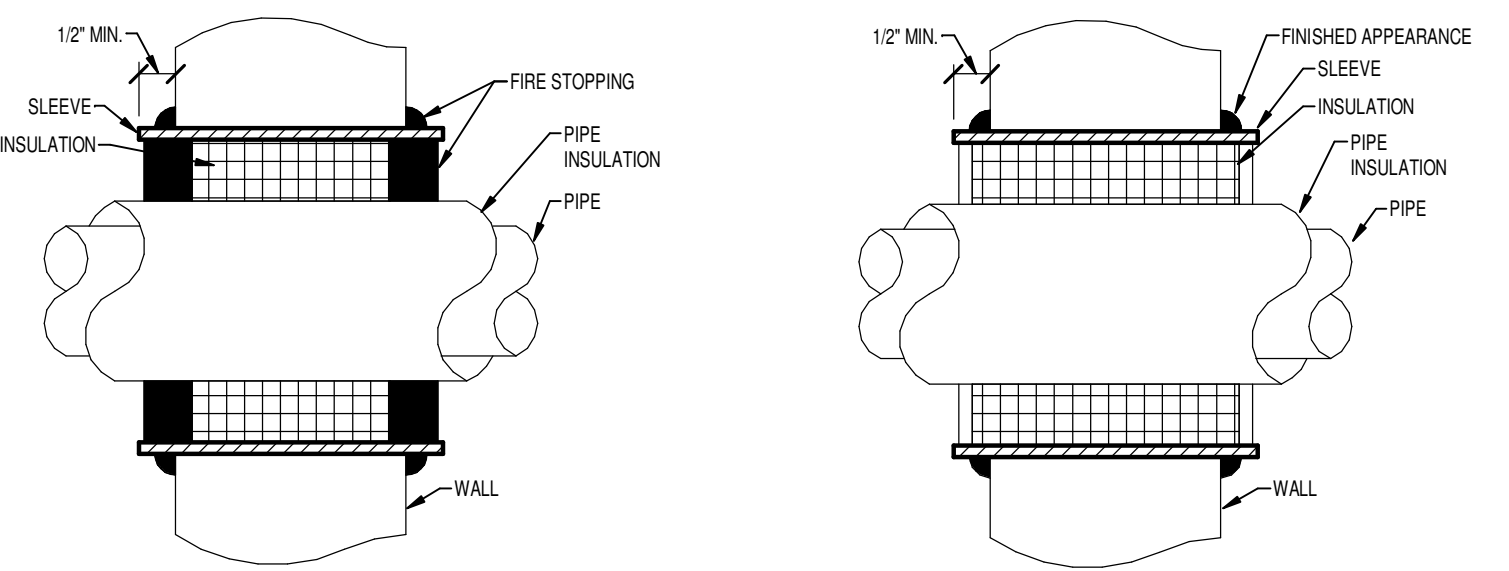
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SCHEDULE OF PLUMBING FIXTURES																		
MARK	FIXTURE	MANUFACTURER	MODEL No.	FIXTURE TYPE	FIXTURE MATERIAL	FIXTURE STYLE	MANUFACTURER	MODEL No.	FAUCET / VALVE	SPOUT	HANDLES	CENTERS	SUPPLY STOPS	TYPE	SIZE	DRAIN TRAP / ARM SIZE	TAILPIECE	DOMESTIC
ST	SINK	ELKAY	ELUH4D141445	UNDERMOUNT	18 GAUGE, 304 STAINLESS STEEL	SINGLE COMPARTMENT T-3-HOLE	ZURN	ZB12C3-XL	8" GOOSNECK FAUCET, 2.2 GPM VR AERATOR		DOME LEVEL HANDLES	4	MCQUIRE MFG. CO. LFBV01	ELKAY LK18B OPEN GRID	1 1/2"	17 GAUGE 1 1/2" x 1 1/2"	OFFSET	1/2"
SB1	SUPPLY BOX	GUY GRAY	SSMIB1AB		304 STAINLESS STEEL, 20 GAUGE								1/4 TURN VALVE SUPPLIED WITH BOX					1/2"
REMARKS																		
P-TRAP SHALL BE ADJUSTABLE CAST BRASS W/ CLEANOUT. PRE-MOLDED PROTECTIVE COVERINGS FOR TAILPIECES, TRAP, AND SUPPLIES. PROVIDE WITH THERMOSTATIC MIXING VALVE.																		
PROVIDE WITH BACKFLOW PREVENTER AND FILTER FOR CONNECTION TO EQUIPMENT. EVERPURE MODEL QL2-QCS FILTER HEAD, MEDIA SHALL BE 0.5 MICRON AND 0.5 GPM SEE DETAIL. PROVIDE ADDITIONAL FRAMING AROUND BOX FOR SECURE MOUNTING.																		

SCHEDULE OF ELECTRIC POINT OF USE WATER HEATERS									
NOTES: 1. WATER HEATER SHALL BE ELECTRIC. 2. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL STATE FORMS, SUBMITTALS, FEES, PERMITS, ETC. AS REQUIRED FOR WATER HEATER INSTALLATION. 3. BASIS OF DESIGN IS INDICATED IN SCHEDULE. OTHER APPROVED MANUFACTURERS EQUIPMENT MUST MEET ALL THE PERFORMANCE REQUIREMENTS INDICATED.									
MARK	MANUFACTURER	MODEL No.	TEMPERATURE RISE @ 0.5 GPM	HOT WATER TEMP OUT	KW INPUT	VOLTAGE	ELECTRICAL PHASE	FREQUENCY	REMARKS
DWH1	EEMAX	SP9512	48 °F	110 °F	3.5	120 V	1	60 Hz	SEE ABOVE

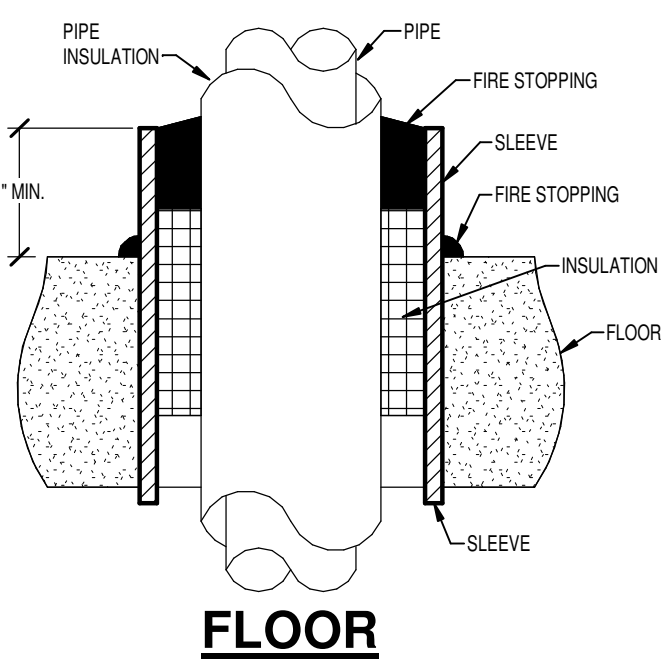


2 TYPICAL INSULATED PIPE HANGER DETAIL
SCALE: NONE



3 TYPICAL SERVICE STOP INSTALLATION
SCALE: NONE

INTERIOR RATED WALL

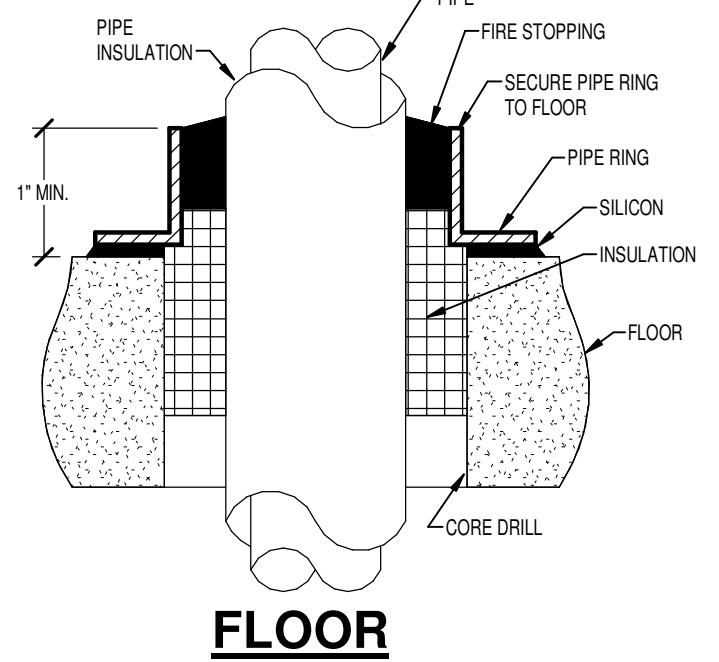


FLOOR

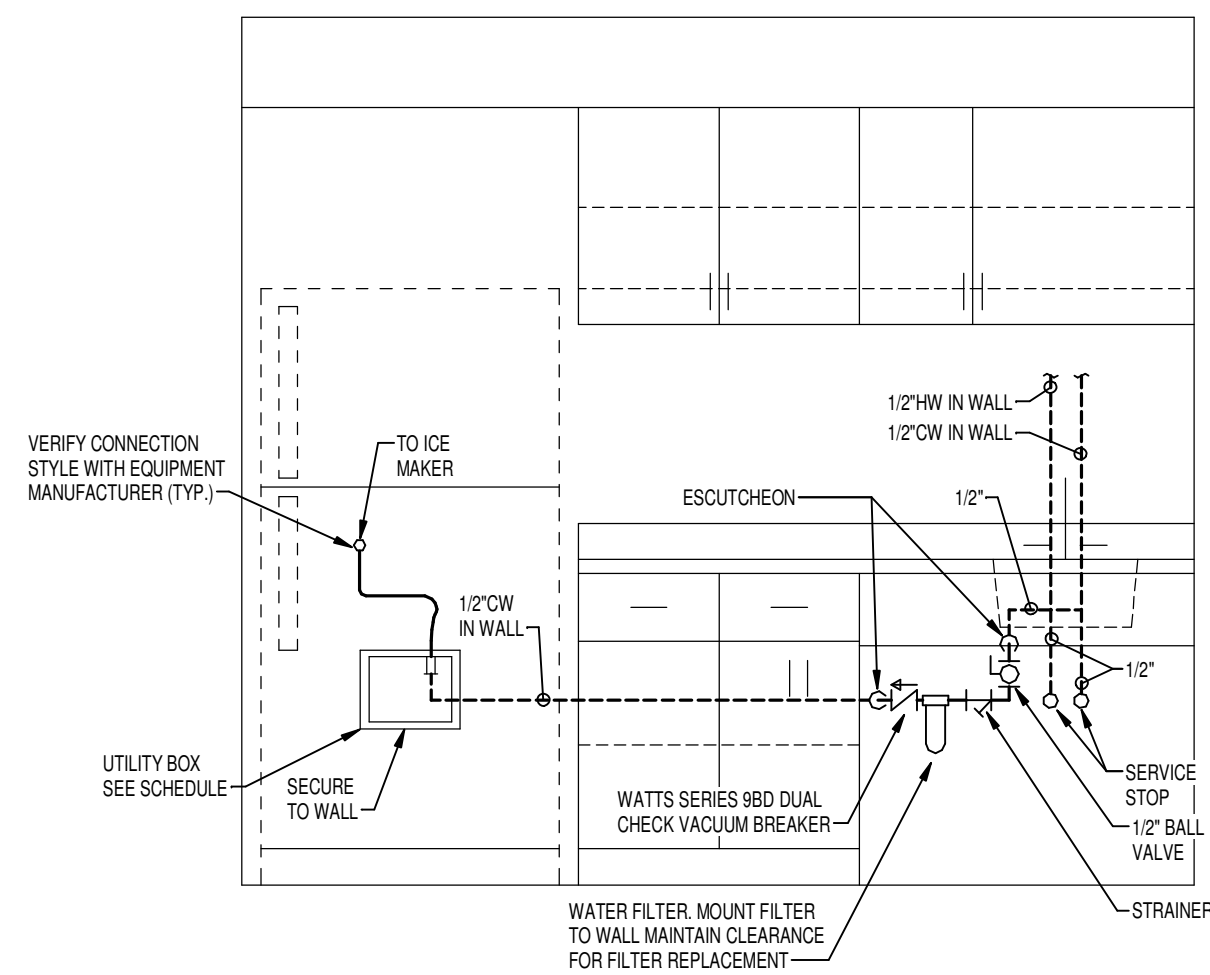
- NOTES:
1. INSTALL FIRE STOP PER MANUFACTURERS RECOMMENDATION.
2. SEE ARCHITECT DRAWINGS FOR LOCATIONS.

4 INTERIOR AND FLOOR PIPE SLEEVE DETAIL
SCALE: NONE

INTERIOR NON RATED WALL

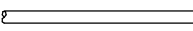
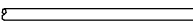
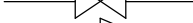
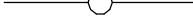
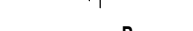
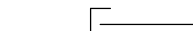
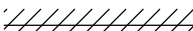


FLOOR



5 SUPPLY BOX DETAIL (SB1)
SCALE: NONE

PLUMBING LEGEND

ABBREVIATION	3D	2D
CO	CLEANOUT	 SANITARY WASTE
CW	DOMESTIC COLD WATER	 SANITARY VENT
DWH	DOMESTIC WATER HEATER	 DOMESTIC COLD WATER
EX	EXISTING	 DOMESTIC HOT WATER
HW	DOMESTIC HOT WATER	 GATE VALVE
L	LAVATORY	 PRESSURE REDUCING VALVE
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER	 BALL VALVE
S	COMMERCIAL SINK	 CHECK VALVE
SB	SUPPLY BOX	 CIRCUIT SETTER
TMV	THERMOSTATIC MIXING VALVE	 STRAINER
V	SANITARY VENT	 FLOW-IN DIRECTION OF ARROW
VTR	VENT THRU ROOF	 VALVE IN VERTICAL
W	SANITARY WASTE	 RISE OR DROP
WC	WATER CLOSET	 BRANCH CONNECTION
		 RISER DOWN
		 RISE UP
		 THERMOSTATIC MIXING VALVE
		 THERMOMETER
		 PRESSURE GAUGE
		 END CAP
		 CONNECTION POINT - NEW TO EXISTING
		 INDICATES REMOVAL
		 KEYNOTE

GENERAL NOTES:

APPLIES TO ALL SHEETS

- THE REMOVAL DRAWINGS SERVE TO AID THE CONTRACTOR IN THE EVALUATION OF THE EXTENT OF DEMOLITION, BUT SHALL NOT BE HELD TO ALL INCLUSIVE.
- CONDITIONS SHOWN ON THE PLANS RELATIVE TO THE WORK TO BE PERFORMED ARE BASED ON THE BEST INFORMATION AVAILABLE AND SUBJECT TO VERIFICATION. VERIFY LOCATIONS AND ELEVATIONS OF UTILITIES TO BE CROSSED OR CONNECTED. CORRECT DEFICIENCIES CAUSED BY FAILURE TO PERFORM SUCH VERIFICATIONS AT NO EXPENSE TO OWNER. IMMEDIATELY NOTIFY ARCHITECT AND ENGINEER OF CONDITION IN CONFLICT WITH THE DETAILS/PLANS.
- FOR FURTHER INFORMATION WITH REGARD TO THE EXTENT OF DEMOLITION & REMOVALS, SEE THE NEW CONSTRUCTION DRAWINGS AND THE ARCHITECTURAL DRAWINGS WHICH SHOW WORK TO BE PERFORMED.
- OWNER SHALL BE GIVEN FIRST CHOICE ON ALL EQUIPMENT BEING REMOVED THAT WILL NOT BE RELOCATED. CONTRACTOR SHALL REVIEW THE EXISTING EQUIPMENT WITH OWNER. EQUIPMENT BEING REMOVED OR RELOCATED SHALL BE REMOVED IN A MANNER THAT REUSE IS POSSIBLE AND STORED AS DIRECTED BY OWNER. ALL OTHER EQUIPMENT SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED & DISPOSED OF FROM THE SITE BY THE CONTRACTOR.
- CUT, PATCH & REPAIR ALL OPENINGS IN WALLS, FLOORS, CEILING, ETC. WHERE REQUIRED BY THE REMOVAL OF EQUIPMENT AND ACCESSORIES AND NEW CONSTRUCTION. PATCHING SHALL MATCH EXISTING CONSTRUCTION & FINISHES. COORDINATE ALL PATCHING AND FINISHES WITH ARCHITECT.
- IF PLUMBING LINES SERVING PLUMBING EQUIPMENT TO REMAIN MUST BE REMOVED DUE TO DEMOLITION OR NEW CONSTRUCTION, THE UTILITIES SHALL BE RELOCATED IN A MANNER THAT IS ACCEPTABLE BY THE ARCHITECT/ENGINEER. PROPER SLOPE, MATERIALS, AND SIZES OF PIPING SHALL BE MAINTAINED TO INSURE EQUIPMENT IS MADE FULLY OPERATIONAL.
- REMOVAL OF EXISTING UTILITIES SHALL BE MADE SO THAT SERVICE TO OTHER AREAS UTILIZED BY THE OWNER ARE NOT INTERRUPTED WITHOUT CONSENT FROM OWNER. PROVIDE TEMPORARY VALVES AND TEMPORARY SERVICES REQUIRED DURING DEMOLITION AND NEW CONSTRUCTION.
- EXISTING INFORMATION SHOWN ON FLOOR PLANS IS FROM ORIGINAL RECORD DRAWINGS AND FIELD INVESTIGATION. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS IN THE FIELD BEFORE COMMENCEMENT OF WORK. THE CONTRACTOR IS REQUIRED TO REPORT TO THE ARCHITECT DISCREPANCIES OR INCONSISTENCIES BETWEEN THE SPECIFIED DESIGN AND EXISTING CONDITIONS FOR CLARIFICATION PRIOR TO COMMENCEMENT OF THE WORK. ABSOLUTE ACCURACY OF THE DRAWINGS CANNOT BE GUARANTEED. WHILE EVERY EFFORT HAS BEEN MADE TO COORDINATE THE LOCATION OF EXISTING EQUIPMENT, PIPING, ETC. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE EXACT REQUIREMENTS GOVERNED BY ACTUAL JOB CONDITIONS.
- PLUMBING SYSTEMS SHALL BE DESIGNED AND INSTALLED PER LOCAL PLUMBING CODE.
- REPORT TO ARCHITECT IN WRITING, CONDITIONS WHICH WILL PREVENT PROPER PROVISION OF THIS WORK.
- THE DRAWINGS SHOWING THE LOCATIONS OF PLUMBING EQUIPMENT, PIPING, ETC. ARE DIAGRAMMATIC. CONTRACTOR SHALL PROVIDE ALL OFFSETS, ADJUSTMENTS ETC. JOB CONDITIONS MAY NOT PERMIT THEIR INSTALLATION AT THE LOCATIONS SHOWN. THE PLUMBING DRAWINGS SHOW THE GENERAL ARRANGEMENT OF EQUIPMENT, PIPING, DEVICES, ETC. & SHALL BE FOLLOWED AS CLOSE AS POSSIBLE.
- LOCATE VALVES FOR SERVICE ACCESSIBILITY. PROVIDE VALVE TAGS & PLASTIC LAMINATE IDENTIFICATION ON CEILING FOR ALL NEW AND EXISTING VALVES AND EQUIPMENT LOCATED WITHIN THE CONSTRUCTION LIMITS AS INDICATED IN THE SPECIFICATIONS.
- CONTRACTOR SHALL VERIFY REQUIREMENTS TO OWNER PROVIDED EQUIPMENT WITH EQUIPMENT MANUFACTURER. PROVIDE ALL UTILITIES & ACCESSORIES REQUIRED FOR THIS EQUIPMENT FOR A COMPLETE OPERABLE SYSTEM.
- PLUMBING FIXTURES & EQUIPMENT TO REMAIN OR BE RELOCATED SHALL BE PROTECTED DURING CONSTRUCTION, AFTER CONSTRUCTION CLEAN & CAULK ALL FIXTURES & EQUIPMENT TO THE SATISFACTION OF THE OWNER.
- SEAL ALL OPENINGS NEW & EXISTING AROUND PLUMBING & UTILITY LINES PENETRATING FIRE WALLS. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION OF FIRE WALLS & ARCHITECTURAL SPECS FOR MATERIAL & INSTALLATION.
- CONTRACTOR SHALL COORDINATE WITH ARCHITECT ALL CONSTRUCTION PHASING AS IT APPLIES TO DEMOLITION & NEW WORK.

REVISIONS

No.	Date	Description



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Project

VINELAND MUNICIPAL COURT RENOVATIONS

736 E LANDIS AVE
VINELAND, NEW JERSEY 08310

Drawing

PLUMBING LEGEND AND DETAILS

Scale

As indicated

Job

22.019

Sheet

P0.1

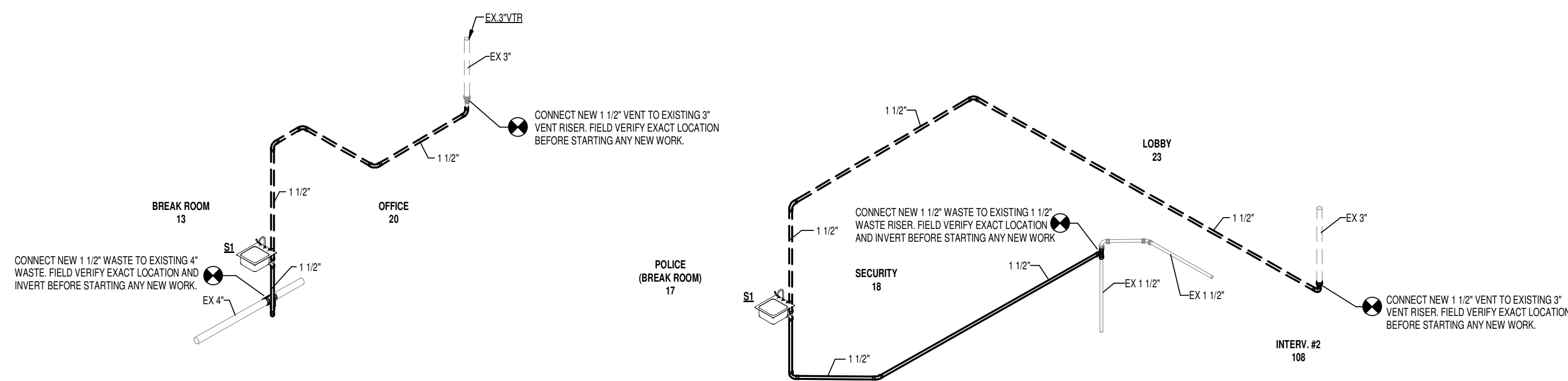
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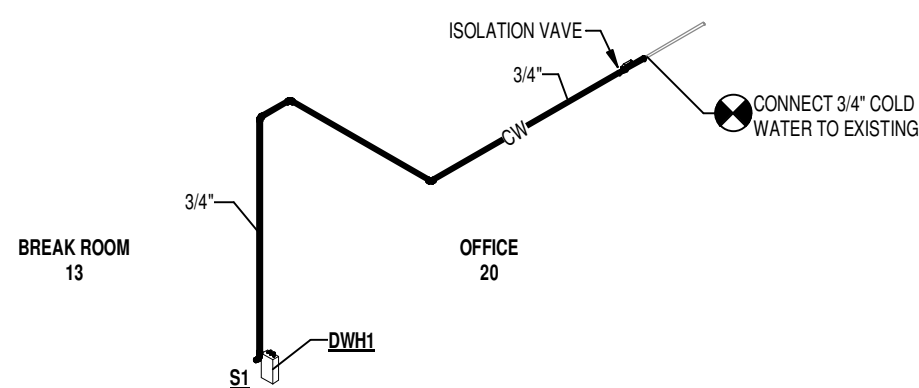
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8/1/2025

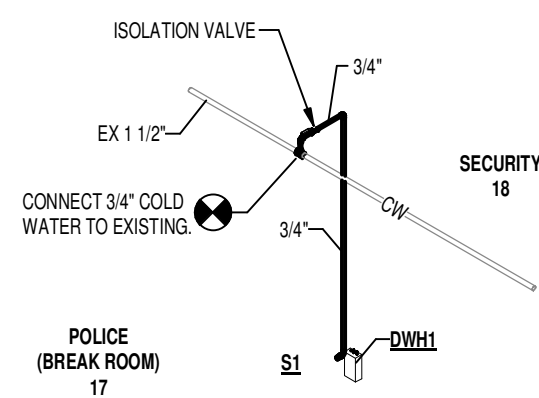
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5 WASTE AND VENT RISER DIAGRAM
SCALE: NONE

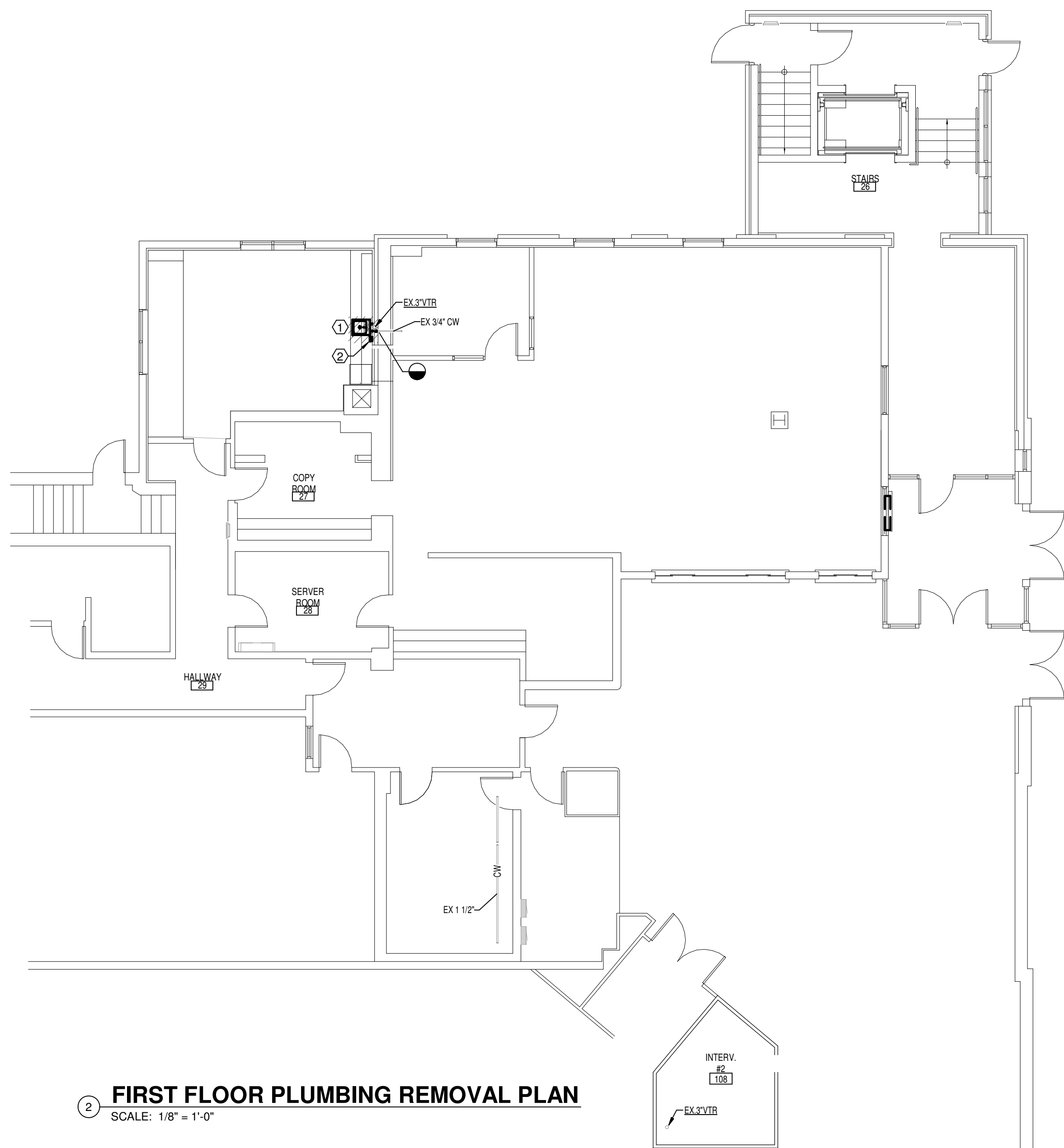


6 DOMESTIC WATER RISER DIAGRAM
SCALE: NONE

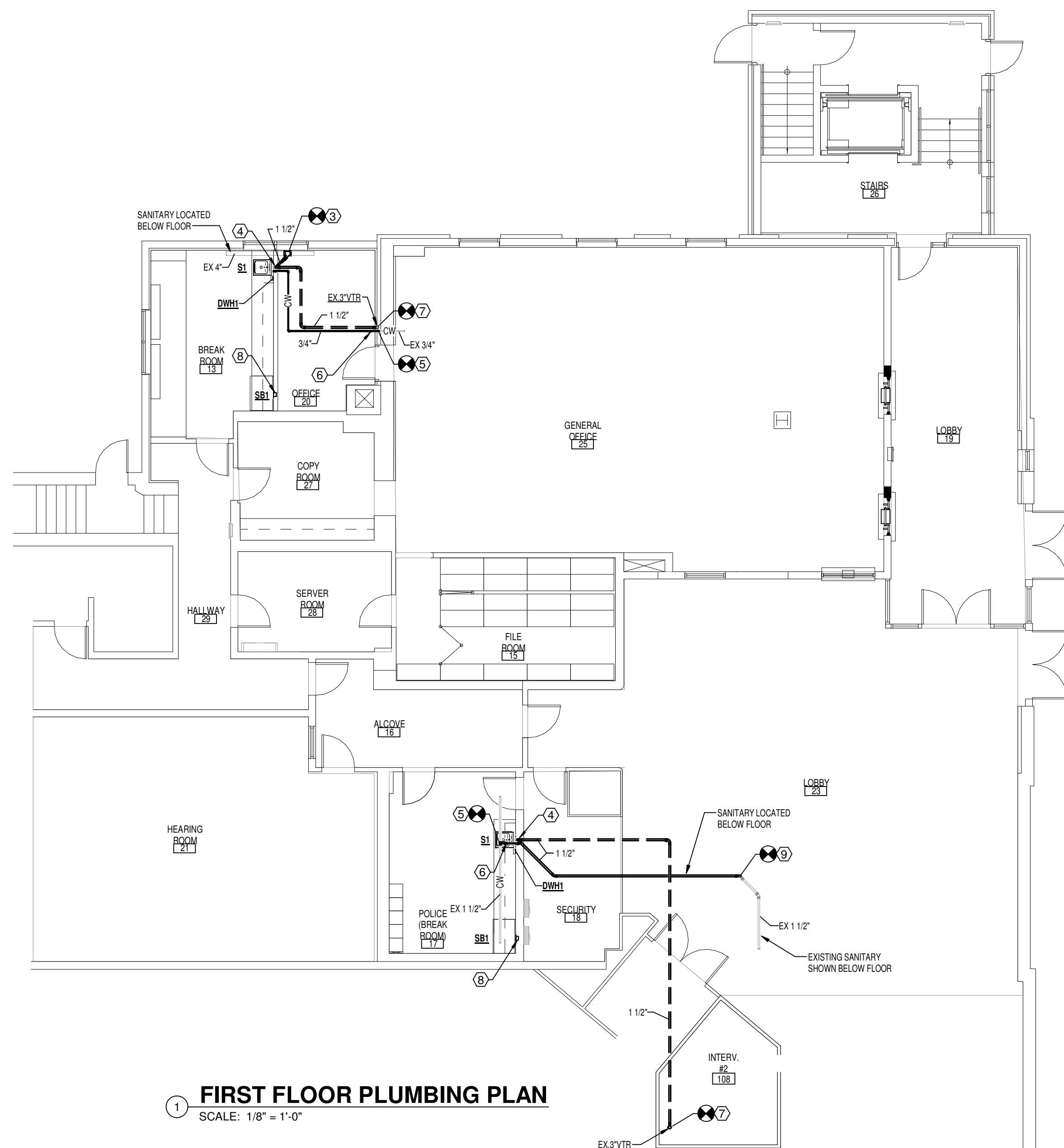


KEYED NOTES:

1. REMOVE EXISTING FIXTURE COMPLETE. REMOVE WASTE PIPING TO BELOW FLOOR AND CAP. REMOVE VENT AND DOMESTIC WATER PIPING TO ABOVE CEILING AND PREPARE FOR NEW CONNECTION.
2. REMOVE EXISTING POINT OF USE WATER HEATER COMPLETE, INCLUDING ALL ACCESSORIES.
3. CONNECT NEW 1 1/2" SANITARY TO EXISTING 4" SANITARY BELOW FLOOR. FIELD VERIFY EXACT LOCATION AND INVERT BEFORE STARTING ANY NEW WORK.
4. 1 1/2" VENT AND 3/4" COLD WATER DOWN. EXTEND AND CONNECT 1 1/2" COLD WATER TO DWH1 AND TO FIXTURE. EXTEND AND CONNECT 1 1/2" HOT WATER FROM DWH1 TO FIXTURE. 1 1/2" WASTE UP TO FIXTURE FROM BELOW FLOOR.
5. CONNECT NEW 3/4" COLD WATER TO EXISTING ABOVE CEILING.
6. ISOLATION VALVE.
7. CONNECT NEW 1 1/2" VENT TO EXISTING 3" VENT RISER. FIELD VERIFY EXACT LOCATION BEFORE STARTING ANY NEW WORK.
8. EXTEND AND CONNECT 1/2" COLD WATER FROM SINK TO SERVE SBI. SEE DETAIL.
9. CONNECT NEW 1 1/2" WASTE TO EXISTING 1 1/2" WASTE RISER. FIELD VERIFY EXACT LOCATION AND INVERT BEFORE STARTING ANY NEW WORK.



2 FIRST FLOOR PLUMBING REMOVAL PLAN
SCALE: 1/8" = 1'-0"



1 FIRST FLOOR PLUMBING PLAN
SCALE: 1/8" = 1'-0"

REVISIONS		
No.	Date	Description



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David G. Manders AIA AI-07220
Lawrence J. Merighi AIA AI-07473
Ronald P. Portadin AIA AI-13058
Peter W. Farrell AIA AI-13618

Project

VINELAND MUNICIPAL
COURT RENOVATIONS

736 E LANDIS AVE
VINELAND, NEW JERSEY 08310

Drawing

PLUMBING PLAN

Scale

As indicated

Job

22.019

Sheet

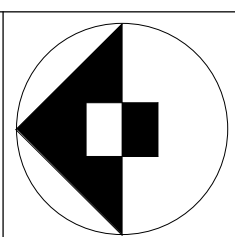
P1.0

Drawn

MRS

Date

8/1/2025



**PLEASE USE THE
FOLLOWING DOCUMENTS
WHEN SUBMITTING BOTH
YOUR ORIGINAL AND
DUPLICATE BID**

PLEASE PRINT (LEGIBLY) OR TYPE

Accompanying this proposal is a certified check in the amount of \$_____, a cashier's check in the amount of \$_____, or a bid bond in the amount of \$_____, payable to the City of Vineland which is to be forfeited as liquidated damages, if in the event that this proposal is accepted, the undersigned shall fail to execute the contract or to furnish satisfactory bond as require.

WITNESS_____

The bidder shall state on the line below, if a corporation, the name of the state in which incorporated.

(Contact Person Who Prepared Proposal)

(Telephone Number)

(Federal I.D. Number)

(Fax Number)

(Email address)

COMPANY_____

ADDRESS_____

TELEPHONE_____

BY_____
(Signature)

(Name-please print or type)

(Title)

DATE_____

Have you attached the required items listed on the Check List? Failure to do so may result in automatic rejection of this bid.

PROPOSAL
COV BID # 2025-32 (RE-BID)
CITY OF VINELAND MUNICIPAL COURT RENOVATIONS
DUE: 11-20-25

To the Purchasing Agent of the City of Vineland

The undersigned bidder declares he/she has read the Notice to Bidders, Instructions to Bidders, and Specifications attached, that he/she has determined the conditions affecting the bid, and agrees, if this proposal is accepted and contract awarded, to furnish and deliver the following:

1. TOTAL ALL-INCLUSIVE RENOVATIONS: \$ _____
(numbers)

\$ _____
(words)

2. PLUS LUMP SUM CONTRACT ALLOWANCE: **\$50,000.00**

GRAND TOTAL (1 & 2): \$ _____
(numbers)

\$ _____
(words)

CONTRACTOR: _____

BID CHECKLIST

**Failure by the bidder to submit with their bid all of the MANDATORY
Items that are check below shall be cause for rejection of bid.**

CITY OF VINELAND MUNICIPAL COURT RENOVATIONS COV BID # 2025-32 (RE-BID)

DATE (11-20-25)

	<u>REQUIRED WITH BID</u>	<u>INITIAL & SUBMIT</u>
1. Bid Guarantee (IN DUPLICATE (A bid bond is not a consent of surety)	<u> X </u>	<u> </u>
2. Certificate or Consent of Surety Form (IN DUPLICATE)	<u> X </u>	<u> </u>
3. Statement of Ownership Disclosure (IN DUPLICATE)	<u> X </u>	<u> </u>
4. EEO/Affirmative Action Compliance Notice (IN DUPLICATE)	<u> X </u>	<u> </u>
5. Check List (IN DUPLICATE)	<u> X </u>	<u> </u>
6. Proposal (IN DUPLICATE)	<u> X </u>	<u> </u>
7. Acknowledgement of Receipt of Addenda (IN DUPLICATE)	<u> X </u>	<u> </u>
8. List of Subcontractors per NJSA 40A:11-16, If any, if none, state so. (IN DUPLICATE)	<u> X </u>	<u> </u>

The items that are checked below shall be submitted no later than the time period indicated.

<u>Required as Conditioned</u>	<u>Item</u>	<u>Read, Initialed Shall Submit</u>
<u> X </u>	Performance Bond (Due with the executed contract)	<u> </u>
<u> </u>	Labor and Material Payment Bond (Due with the executed contract)	<u> </u>

(continued next page)

<u> X </u>	Maintenance Bond (Due with the executed contract)	_____
<u> X </u>	Public Works Contractor Registration Certificate(s) for the General or Prime Contractor and any Subcontractor submitted in the bid proposal with a date effective at the time the proposal is submitted (Due prior to contract award)	_____
<u> X </u>	New Jersey Business Registration Certificate (Due prior to contract award)	_____
<u> X </u>	Disclosure of Investment Activities in Iran (Due prior to contract award)	_____
<u> X </u>	Certificate(s) of Insurance as specified In the Bid Document (Due with executed contract)	_____
<u> X </u>	Certification of Non-Debarment for Federal Contracts. (Due prior to contract award)	_____
<u> X </u>	Certification of Regarding Debarment Suspension. (Due prior to contract award)	_____

The items that are checked below are to be reviewed by the bidders.

<u>Review Required</u>	<u>Item</u>	<u>Read & Initialed</u>
<u> X </u>	Americans with Disabilities Act Language	_____
<u> X </u>	General Instructions	_____
<u> X </u>	Technical Specifications	_____

THE ITEMS AND/OR FORMS INDICATED ABOVE SHALL BE REVIEWED AND/OR SUBMITTED WITH YOUR BID. THIS CHECKLIST IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY. ALL REQUIRED DOCUMENTATION MAY NOT BE LISTED ABOVE AND IT SHALL BE THE RESPONSIBILITY OF THE BIDDER TO CAREFULLY REVIEW THE COMPLETE BID PACKAGE, FAMILIARIZE THEMSELVES WITH THE REQUIREMENTS OF THIS BID AND TO SUBMIT WITH THEIR BID ALL REQUIRED DOCUMENTATION.

SIGNATURE

The undersigned hereby acknowledges that they have submitted and/or reviewed the above listed requirements:

(COMPANY)

(NAME – PLEASE PRINT OR TYPE)

(SIGNATURE)

(DATE)

STATEMENT OF OWNERSHIP DISCLOSURE

N.J.S.A. 52:25-24.2 (P.L. 1977, c.33, as amended by P.L. 2016, c.43)

This statement shall be completed, certified to, and included with all bid and proposal submissions. Failure to submit the required information is cause for automatic rejection of the bid or proposal.

Name of Organization: _____

Organization Address: _____

Part I

Check the box that represents the type of business organization:

- ☐ Sole Proprietorship (skip Parts II and III, execute certification in Part IV)
☐ Non-Profit Corporation (skip Parts II and III, execute certification in Part IV)
☐ For-Profit Corporation (any type)
☐ Limited Liability Company (LLC)
☐ Partnership
☐ Limited Partnership
☐ Limited Liability Partnership (LLP)
☐ Other (be specific): _____

Part II

The list below contains the names and addresses of all stockholders in the corporation who own 10 percent or more of its stock, of any class, or of all individual partners in the partnership who own a 10 percent or greater interest therein, or of all members in the limited liability company who own a 10 percent or greater interest therein, as the case may be. **(COMPLETE THE LIST BELOW IN THIS SECTION)**

OR

No one stockholder in the corporation owns 10 percent or more of its stock, of any class, or no individual partner in the partnership owns a 10 percent or greater interest therein, or no member in the limited liability company owns a 10 percent or greater interest therein, as the case may be. **(SKIP TO PART IV)**

(Please attach additional sheets if more space is needed):

Name of Individual or Business Entity	Address

Part III**DISCLOSURE OF 10% OR GREATER OWNERSHIP IN THE STOCKHOLDERS, PARTNERS OR LLC MEMBERS LISTED IN PART II**

If a bidder has a direct or indirect parent entity which is publicly traded, and any person holds a 10 percent or greater beneficial interest in the publicly traded parent entity as of the last annual federal Security and Exchange Commission (SEC) or foreign equivalent filing, ownership disclosure can be met by providing links to the website(s) containing the last annual filing(s) with the federal Securities and Exchange Commission (or foreign equivalent) that contain the name and address of each person holding a 10% or greater beneficial interest in the publicly traded parent entity, along with the relevant page numbers of the filing(s) that contain the information on each such person. **Attach additional sheets if more space is needed.**

Website (URL) containing the last annual SEC (or foreign equivalent) filing	Page #'s

Please list the names and addresses of each stockholder, partner or member owning a 10 percent or greater interest in any corresponding corporation, partnership and/or limited liability company (LLC) listed in Part II **other than for any publicly traded parent entities referenced above**. The disclosure shall be continued until names and addresses of every noncorporate stockholder, and individual partner, and member exceeding the 10 percent ownership criteria established pursuant to N.J.S.A. 52:25-24.2 has been listed. **Attach additional sheets if more space is needed.**

Stockholder/Partner/Member and Corresponding Entity Listed in Part II	Address

Part IV**Certification**

I, being duly sworn upon my oath, hereby represent that the foregoing information and any attachments thereto to the best of my knowledge are true and complete. I acknowledge: that I am authorized to execute this certification on behalf of the bidder/proposer; that the _____ is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the completion of any contracts with _____ to notify the _____ in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the, permitting the _____ to declare any contract(s) resulting from this certification void and unenforceable.

Full Name (Print):		Title:	
Signature:		Date:	

AFFIRMATIVE ACTION COMPLIANCE NOTICE
N.J.S.A. 10:5-31 and N.J.A.C. 17:27

GOODS AND SERVICES CONTRACTS
(INCLUDING PROFESSIONAL SERVICES)

This form is a summary of the successful bidder's requirement to comply with the requirements of N.J.S.A. 10:5-31 and N.J.A.C. 17:27-1 et seq.

The successful bidder shall submit to the public agency, after notification of award but prior to execution of this contract, one of the following three documents as forms of evidence:

(a) A photocopy of a valid letter that the contractor is operating under an existing Federally approved or sanctioned affirmative action program (good for one year from the date of the letter);

OR

(b) A photocopy of a Certificate of Employee Information Report approval, issued in accordance with N.J.A.C. 17:27-4;

OR

(c) A photocopy of an Employee Information Report (Form AA302) provided by the Division and distributed to the public agency to be completed by the contractor in accordance with N.J.A.C. 17:27-4.

The successful vendor may obtain the Affirmative Action Employee Information Report (AA302) from the contracting unit during normal business hours.

The successful vendor(s) must submit the copies of the AA302 Report to the Division of Contract Compliance and Equal Employment Opportunity in Public Contracts (Division). The Public Agency copy is submitted to the public agency, and the vendor copy is retained by the vendor.

The undersigned vendor certifies that he/she is aware of the commitment to comply with the requirements of N.J.S.A. 10:5-31 and N.J.A.C. 17:27.1 et seq. and agrees to furnish the required forms of evidence.

The undersigned vendor further understands that his/her bid shall be rejected as non-responsive if said contractor fails to comply with the requirements of N.J.S.A. 10:5-31 and N.J.A.C. 17:27-1 et seq.

COMPANY: _____ SIGNATURE: _____

PRINT NAME: _____ TITLE: _____

DATE: _____

**FAILURE BY BIDDER TO COMPLETE AND RETURN THIS NOTICE WITH THEIR BID SUBMISSION
SHALL BE CAUSE FOR THEIR BID TO BE REJECTED AS NON-RESPONSIVE**

CITY OF VINELAND
ACKNOWLEDGMENT OF RECEIPT OF ADDENDA

Pursuant to N.J.S.A. 40A:11-23.1a, the undersigned bidder hereby acknowledges receipt of the following notices, revisions, or addenda to the bid advertisement, specifications or bid documents. By indicating date of receipt, bidder acknowledges the submitted bid takes into account the provisions of notice, revision or addendum. Note that the local unit's record of notice to bidders shall take precedence and that failure to include provisions of changes in a bid proposal may be subject for rejection of the bid.

The undersigned Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Dated	Acknowledge Receipt (initial)
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

☐ **No addenda were received:**

Acknowledged for: _____
(Name of Bidder)

By: _____
(Signature of Authorized Representative)

Name: _____
(Print or Type)

Title: _____

Date: _____



DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN FORM

STATE OF NEW JERSEY
DEPARTMENT OF THE TREASURY - DIVISION OF PURCHASE AND PROPERTY
33 WEST STATE STREET, P.O. BOX 230 TRENTON, NEW JERSEY 08625-0230

BID SOLICITATION # AND TITLE: _____

VENDOR NAME: _____

Pursuant to N.J.S.A. 52:32-57, et seq. (P.L. 2012, c.25 and P.L. 2021, c.4) any person or entity that submits a bid or proposal or otherwise proposes to enter into or renew a contract must certify that neither the person nor entity, nor any of its parents, subsidiaries, or affiliates, is identified on the New Jersey Department of the Treasury's Chapter 25 List as a person or entity engaged in investment activities in Iran. The Chapter 25 list is found on the Division's website at <https://www.state.nj.us/treasury/purchase/pdf/Chapter25List.pdf>. Vendors/Bidders must review this list prior to completing the below certification. If the Director of the Division of Purchase and Property finds a person or entity to be in violation of the law, s/he shall take action as may be appropriate and provided by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and seeking debarment or suspension of the party.

CHECK THE APPROPRIATE BOX

☐ I certify, pursuant to N.J.S.A. 52:32-57, et seq. (P.L. 2012, c.25 and P.L. 2021, c.4), that neither the Vendor/Bidder listed above nor any of its parents, subsidiaries, or affiliates is listed on the New Jersey Department of the Treasury's Chapter 25 List of entities determined to be engaged in prohibited activities in Iran.

OR

☐ I am unable to certify as above because the Vendor/Bidder and/or one or more of its parents, subsidiaries, or affiliates is listed on the New Jersey Department of the Treasury's Chapter 25 List. I will provide a detailed, accurate and precise description of the activities of the Vendor/Bidder, or one of its parents, subsidiaries or affiliates, has engaged in regarding investment activities in Iran by completing the information requested below.

Entity Engaged in Investment Activities
Relationship to Vendor/ Bidder
Description of Activities

Duration of Engagement
Anticipated Cessation Date

**Attach Additional Sheets If Necessary.*

CERTIFICATION

I, the undersigned, certify that I am authorized to execute this certification on behalf of the Vendor, that the foregoing information and any attachments hereto, to the best of my knowledge are true and complete. I acknowledge that the State of New Jersey is relying on the information contained herein, and that the Vendor is under a continuing obligation from the date of this certification through the completion of any contract(s) with the State to notify the State in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification. If I do so, I may be subject to criminal prosecution under the law, and it will constitute a material breach of my contract(s) with the State, permitting the State to declare any contract(s) resulting from this certification void and unenforceable.

Signature

Date

Print Name and Title



CERTIFICATION OF NON-INVOLVEMENT IN PROHIBITED ACTIVITIES IN RUSSIA OR BELARUS

Pursuant to N.J.S.A. 52:32-60.1, et seq. ([L. 2022, c. 3](#)) any person or entity (hereinafter "Vendor") that seeks to enter into or renew a contract with a State agency for the provision of goods or services, or the purchase of bonds or other obligations, must complete the certification below indicating whether or not the Vendor is identified on the Office of Foreign Assets Control (OFAC) Specially Designated Nationals and Blocked Persons list, available here: <https://sanctionssearch.ofac.treas.gov/>. If the Department of the Treasury finds that a Vendor has made a certification in violation of the law, it shall take any action as may be appropriate and provided by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and seeking debarment or suspension of the party.

I, the undersigned, certify that I have read the definition of "Vendor" below, and have reviewed the Office of Foreign Assets Control (OFAC) Specially Designated Nationals and Blocked Persons list, and having done so certify:

(Check the Appropriate Box)

- ☐ A. That the Vendor is not identified on the [OFAC Specially Designated Nationals and Blocked Persons list on account of activity related to Russia and/or Belarus](#).
- OR**
- ☐ B. That I am unable to certify as to "A" above, because the Vendor is identified on the [OFAC Specially Designated Nationals and Blocked Persons list on account of activity related to Russia and/or Belarus](#).
- OR**
- ☐ C. That I am unable to certify as to "A" above, because the Vendor is identified on the [OFAC Specially Designated Nationals and Blocked Persons list](#). However, the Vendor is engaged in activity related to Russia and/or Belarus consistent with federal law, regulation, license or exemption. A detailed description of how the Vendor's activity related to Russia and/or Belarus is consistent with federal law is set forth below.

(Attach Additional Sheets If Necessary.)

Signature of Vendor's Authorized Representative

Date

Print Name and Title of Vendor's Authorized Representative

Vendor's FEIN

Vendor's Name

Vendor's Phone Number

Vendor's Address (Street Address)

Vendor's Fax Number

Vendor's Address (City/State/Zip Code)

Vendor's Email Address

ⁱ Vendor means: (1) A natural person, corporation, company, limited partnership, limited liability partnership, limited liability company, business association, sole proprietorship, joint venture, partnership, society, trust, or any other nongovernmental entity, organization, or group; (2) Any governmental entity or instrumentality of a government, including a multilateral development institution, as defined in Section 1701(c)(3) of the International Financial Institutions Act, 22 U.S.C. 262r(c)(3); or (3) Any parent, successor, subunit, direct or indirect subsidiary, or any entity under common ownership or control with, any entity described in paragraph (1) or (2).

**CERTIFICATION REGARDING THE DEBARMENT
SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION**

I am _____ of the firm of _____,
(Your title) (Name of your Organization)

(Address of your Organization)

CHOOSE ONE OF THE FOLLOWING

☐

A. I hereby certify on behalf of _____
(Name of your Organization)

That neither it nor its principals are included on the State Treasurer's and Economic Development Authority's or the Federal Government's list of Debarred, Suspended or Disqualified bidders as a result of action taken by any State or Federal Agency.

☐

B. I am unable to certify to any of the statements set forth in the certification. I have attached an explanation to this form.

Subscribed and sworn to
Before me this day of

(Date)

(Signature)

(Signature of Notary Public)

(Typed or Printed Name & Title)

My Commission expires _____
(Date)

**CERTIFICATION OF NON-DEBARMENT
FOR FEDERAL GOVERNMENT CONTRACTS**

N.J.S.A. 52:32-44.1 (P.L. 2019, c.406)

This certification shall be completed, certified to, and submitted to the contracting unit prior to contract award, except for emergency contracts where submission is required prior to payment.

PART I: VENDOR INFORMATION	
Individual or Organization Name	
Physical Address of Individual or Organization	
Unique Entity ID (if applicable)	
CAGE/NCAGE Code (if applicable)	
Check the box that represents the type of business organization:	

- ☐ Sole Proprietorship (skip Parts III and IV) ☐ Non-Profit Corporation (skip Parts III and IV)
- ☐ For-Profit Corporation (any type) ☐ Limited Liability Company (LLC) ☐ Partnership
- ☐ Limited Partnership ☐ Limited Liability Partnership (LLP)
- ☐ Other (be specific): _____

PART II – CERTIFICATION OF NON-DEBARMENT: Individual or Organization			
I hereby certify that the individual or organization listed above in Part I is not debarred by the federal government from contracting with a federal agency. I further acknowledge: that I am authorized to execute this certification on behalf of the above-named organization; that the City of Vineland is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the date of contract award by City of Vineland of Vineland to notify the City of Vineland in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the City of Vineland , permitting the City of Vineland to declare any contract(s) resulting from this certification void and unenforceable.			
Full Name (Print):		Title:	
Signature:		Date:	

PART III – CERTIFICATION OF NON-DEBARMENT: Individual or Entity Owning Greater than 50 Percent of Organization

Section A (Check the Box that applies)

☐	Below is the name and address of the stockholder in the corporation who owns more than 50 percent of its voting stock, or of the partner in the partnership who owns more than 50 percent interest therein, or of the member of the limited liability company owning more than 50 percent interest therein, as the case may be.
Name of Individual or Organization	
Physical Address	

OR

☐	No one stockholder in the corporation owns more than 50 percent of its voting stock, or no partner in the partnership owns more than 50 percent interest therein, or no member in the limited liability company owns more than 50 percent interest therein, as the case may be.

Section B (Skip if no Business entity is listed in Section A above)

☐	Below is the name and address of the stockholder in the corporation who owns more than 50 percent of the voting stock of the organization's parent entity, or of the partner in the partnership who owns more than 50 percent interest in the organization's parent entity, or of the member of the limited liability company owning more than 50 percent interest in organization's parent entity, as the case may be.
Stockholder/Partner/Member Owning Greater Than 50 Percent of Parent Entity	
Physical Address	

OR

☐	No one stockholder in the parent entity corporation owns more than 50 percent of its voting stock, no partner in the parent entity partnership owns more than 50 percent interest therein, or no member in the parent entity limited liability company owns more than 50 percent interest therein, as the case may be.

Section C – Part III Certification

I hereby certify that no individual or organization that is debarred by the federal government from contracting with a federal agency owns greater than 50 percent of the **Organization listed above in Part I** or, if applicable, owns greater than 50 percent of a parent entity of _____. I further acknowledge: that I am authorized to execute this certification on behalf of the above-named organization; that the **City of Vineland** is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the date of contract award **City of Vineland** to notify the **City of Vineland** in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the **City of Vineland**, permitting the **City of Vineland** to declare any contract(s) resulting from this certification void and unenforceable.

Full Name (Print):

Title:

Signature:

Date:

Part IV – CERTIFICATION OF NON-DEBARMENT: Contractor – Controlled Entities**Section A**

Below is the name and address of the corporation(s) in which the **Organization listed in Part I** owns more than 50 percent of voting stock, or of the partnership(s) in which the **Organization listed in Part I** owns more than 50 percent interest therein, or of the limited liability company or companies in which the **Organization listed above in Part I** owns more than 50 percent interest therein, as the case may be.

Name of Business Entity**Physical Address******Add additional sheets if necessary******OR**

The **Organization listed above in Part I** does not own greater than 50 percent of the voting stock in any corporation and does not own greater than 50 percent interest in any partnership or any limited liability company.

Section B (skip if no business entities are listed in Section A of Part IV)			
☐		Below are the names and addresses of any entities in which an entity listed in Part III A owns greater than 50 percent of the voting stock (corporation) or owns greater than 50 percent interest (partnership or limited liability company).	
Name of Business Entity Controlled by Entity Listed in Section A of Part IV		Physical Address	
Add additional Sheets if necessary			
OR			
☐		No entity listed in Part III A owns greater than 50 percent of the voting stock in any corporation or owns greater than 50 percent interest in any partnership or limited liability company.	
Section C – Part IV Certification			
I hereby certify that the Organization listed above in Part I does not own greater than 50 percent of any entity that that is debarred by the federal government from contracting with a federal agency and, if applicable, does not own greater than 50 percent of any entity that in turns owns greater than 50 percent of any entity debarred by the federal government from contracting with a federal agency. I further acknowledge: that I am authorized to execute this certification on behalf of the above-named organization; that the City of Vineland is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the date of contract award by City of Vineland to notify the City of Vineland in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the City of Vineland, permitting the City of Vineland to declare any contract(s) resulting from this certification void and unenforceable.			
Full Name (Print):		Title:	
Signature:		Date:	

SAMPLE FORM OF BID BOND

A. We, the undersigned

_____ as Principal and
_____ as Surety, are hereby held and firmly bound unto
_____ in the penal sum of _____ Dollars

(\$_____, lawful money of the United States for the payment of which well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns. Signed this

_____ day of _____ 20_____

B. THE CONDITION of the above obligation is such that whereas the Principal has submitted to the _____,

a certain bid attached hereto and hereby made a part of hereto and hereby made a part of hereof, to enter into a contract in writing for the (insert type of work)

C. NOW THEREFORE:

If said bid shall be rejected, or in the alternate, if said bid shall be accepted and the Principal shall execute and deliver a contract in the form of Agreement required by the Bid Documents and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all respects perform the agreement created by the acceptance of said bid. Then this obligation shall be void, otherwise the same shall remain in 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.

D. THE SURETY for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall in no way be impaired or affected by an extensions of the time within the "OBLIGEE" may accept such bid. And said Surety does hereby waive notice of any such extension.

E. IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as corporations have caused their corporate seals to be hereto fixed and these presents to be signed by their proper officers, the day and year set forth above.

PRINCIPAL (L.S.)

SURETY

(SEAL)

BY

NOTE: Bid Bond must be signed by an authorized agent or representative of a surety company and not by the individual or company submitting the bid.

SURETY FORM

The City of Vineland has provided this certificate of surety for submission to a bidder's insurance/bonding company. Language such as this will be accepted; however, language that limits the timeframe in which the City can process claims against a performance bond or language that states the surety is conditional depending on contract terms, will not be accepted. (Contract terms will be as outlined in the bid specifications).

To: Purchasing Board
City of Vineland
640 E. Wood Street
Vineland, NJ 08360

NAME OF INSURANCE/BONDING COMPANY

Being duly qualified to transact business in the State of New Jersey, hereby certifies and agrees that if:

CONTRACTOR NAME

Is the successful bidder for _____

_____ It as surety, will provide the bidder with the
bonds as are called for in the bid specifications.

Signed and Sealed _____

NAME OF INSURANCE/BONDING COMPANY

Printed Name of Attorney-in-Fact

Signature of Attorney-in-Fact

Power of Attorney for the Attorney-in-Fact must be attached to Consent of Surety and corporate seal of the surety company must be affixed to the Surety form.

Certificate of Surety must be signed by an authorized agent or representative of a surety company and not by the individual or company submitting the bid.

Insurance/Bonding Company to provide the following:

Name: _____ Title: _____

Address: _____

Telephone Number: _____

CITY OF VINELAND

LIST OF SUBCONTRACTORS

(as required by NJSA40A:11-16)

COV BID # 32 (RE-BID)
11-20-25

The following subcontractors are to be used on this project in the four (4) specialty trade categories noted below: These subcontractors must be registered with the Department of Labor's Division of Wage and Hour Compliance (Public Works Contractor Registration) at the time proposals are received.

NOTE: If the project's scope of work does not involve any of the specialty trade categories below, please write the word "**NONE**" in each appropriate space(s).

If the project's scope of work does involve any of the specialty trade categories below, but will be done "in-house" by the General Contractor or a qualified, licensed employee(s), where required, or by such other employee(s) on the contractor's payroll, write the word "**IN-HOUSE**" and provide the names(s) and license number(s), where required, or the name(s) of those employees(s) in each of the appropriate spaces below:

DO NOT LEAVE ANY SPACE BLANK

1. PLUMBING AND GAS FITTING AND ALL KINDRED WORK:

Name: _____

Address: _____

License Number: _____

2. STEAM AND HOT WATER HEATING AND VENTILATING APPARATUS AND ALL KINDRED WORK:

Name: _____

Address: _____

3. ELECTRICAL WORK:

Name: _____

Address: _____

4. STRUCTURAL STEEL AND ORNAMENTAL IRON WORK:

Name: _____

Address: _____

BY: _____

(SIGNATURE OF AUTHORIZED REPRESENTATIVE)

NAME: _____

(PLEASE PRINT)

DATE: _____

THE ABOVE NAMED SUBCONTRACTORS MUST BE REGISTERED WITH THE DEPARTMENT OF LABOR'S DIVISION OF WAGE AND HOUR COMPLIANCE (PUBLIC WORKS CONTRACTORS REGISTRATION) AT THE TIME PROPOSALS ARE RECEIVED.

BUSINESS REGISTRATION CERTIFICATES MUST BE SUBMITTED, FOR ANY OF THE COMPANIES/INDIVIDUALS LISTED ABOVE AS ONE OF THE FOUR PRIME SUB-CONTRACTORS.

ADDENDUM NO. 1 TO SPECIFICATIONS ISSUED FOR:

COV BID # 2025-32 CITY OF VINELAND MUNICIPAL COURT RENOVATIONS

PROPOSALS TO BE RECEIVED WEDNESDAY, OCTOBER 15, 2025, 2:00 PM PREVAILING TIME BY THE CITY OF VINELAND.

QUESTIONS & RESPONSES

1. Is there an existing BMS system in the Municipal Court building, and if so, who?

No, the Municipal Court building does not have a BMS system.

2. Are there existing security cameras, and will they be removed and relocated during renovations?

Yes, there are existing security cameras. The cameras will be removed and relocated internally by the City of Vineland IT Department.

3. Who is the current vendor for the fire alarm system?

Interactive Security Systems, LLC.

4. Is there a rear exit from the building?

Yes, there is a rear exit from the building.

5. Will onsite facilities be made available?

Yes, restroom facilities inside the Municipal Court building will be made available for contractor/vendor use during renovations.

6. What is the schedule for this project?

Work is scheduled to begin during the week between Christmas and New Year's Eve. The anticipated construction duration is approximately 4–6 months, commencing from the Notice to Proceed.

7. Where can trash and debris be discarded?

Disposal of trash and debris will be coordinated with the City. A dumpster may be placed in one of the parking areas behind the building. The specific location (either near the rear entrance, alongside the adjacent building, or closer to the sally port) will be confirmed by the City before the commencement of work.

ADDITIONAL SECTIONS

The following sections are to be **added** to the technical specifications of the bid (see attached):

- **Section 271100**

- **Section 271500**

IMPORTANT NOTICE

- Bidders must acknowledge receipt of Addendum No. 1 in the BID PACKAGE.
- Failure to acknowledge will result in automatic rejection of the bid.
- All recipients of the BID will receive a copy of this Addendum.
- The deadline for receiving bids remains unchanged.

Issued By:

Miguel A. Mercado, QPA

Purchasing Agent

City of Vineland

640 E. Wood Street

P. O. Box 1508

Vineland, NJ 08362-1508

856-794-4040

Issued Date: October 3, 2025

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Telecommunications mounting elements.
- 2. Backboards.
- 3. Telecommunications equipment racks and cabinets.
- 4. Grounding.

- B. Related sections include the following:

- 1. Division 26 Sections:

- a. "Common Work Results for Electrical"
- b. "Grounding and Bonding for Electrical Systems"
- c. "Identification for Electrical Systems".
- d. "Cable Trays for Electrical Systems".

- 2. Division 27 Sections:

- a. "Communications Horizontal Cabling" for voice and data cabling associated with system panels and devices.

1.3 DEFINITIONS

- A. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.
- B. BICSI: Building Industry Consulting Service International.
- C. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
- D. LAN: Local area network.
- E. RCDD: Registered Communications Distribution Designer.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for equipment racks and cabinets. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings shall be under the direct supervision of RCDD.
 - 2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician, who shall be present at all times when Work of this Section is performed at Project site.
 - 3. Field Inspector: Currently registered by BICSI as RCDD to perform the on-site inspection.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.
- D. Grounding: Comply with ANSI-J-STD-607-A.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install equipment frames and cable trays until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and work above ceilings is complete.

1.7 COORDINATION

- A. Coordinate layout and installation of communications equipment with Owner's telecommunications and LAN equipment and service suppliers. Coordinate service entrance arrangement with local exchange carrier.
 - 1. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.
 - 2. Record agreements reached in meetings and distribute them to other participants.
 - 3. Adjust arrangements and locations of distribution frames, cross-connects, and patch panels in equipment rooms to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.
 - 4. Adjust arrangements and locations of equipment with distribution frames, cross-connects, and patch panels of cabling systems of other communications, electronic safety and security, and related systems that share space in the equipment room.
- B. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

PART 2 - PRODUCTS

2.1 PATHWAYS

- A. General Requirements: Comply with TIA/EIA-569-A.

SECTION 271100 – COMMUNICATIONS EQUIPMENT ROOM FITTINGS

- B. Cable Support: NRTL labeled. Cable support brackets shall be designed to prevent degradation of cable performance and pinch points that could damage cable. Cable tie slots fasten cable ties to brackets.
 - 1. Comply with NFPA 70 and UL 2043 for fire-resistant and low-smoke-producing characteristics.
 - 2. Support brackets with cable tie slots for fastening cable ties to brackets.
 - 3. Lacing bars, spools, J-hooks, and D-rings.
 - 4. Straps and other devices.
- C. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems". Flexible metal conduit shall not be used.
 - 1. Outlet boxes shall be no smaller than 4 inch square, and 2-1/8 inches deep. Provide all trim rings required to install in wall.

2.2 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches. Comply with requirements for plywood backing panels specified in Division 06 Section "Rough Carpentry".

2.3 EQUIPMENT FRAMES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ADC.
 - 2. Aim Electronics; a brand of Emerson Electric Co.
 - 3. AMP; a Tyco International Ltd. company.
 - 4. Cooper B-Line, Inc.
 - 5. Hubbell Premise Wiring.
 - 6. KRONE Incorporated.
 - 7. Leviton Voice & Data Division.
 - 8. Middle Atlantic Products, Inc.
 - 9. Nordex/CDT; a subsidiary of Cable Design Technologies.
 - 10. Ortronics, Inc.
 - 11. Panduit Corp.
 - 12. Siemon Co. (The).
- B. General Frame Requirements:
 - 1. Distribution Frames: Freestanding, modular-steel units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.
 - 2. Module Dimension: Width compatible with EIA 310 standard, 19-inch panel mounting.
 - 3. Finish: Manufacturer's standard, baked-polyester powder coat.
- C. Cable Management for Equipment Frames:
 - 1. Metal, with integral wire retaining fingers.
 - 2. Baked-polyester powder coat finish.
 - 3. Vertical cable management panels shall have front and rear channels, with covers.
 - 4. Provide horizontal crossover cable manager at the top of each relay rack, with a minimum height of two rack units each.

2.4 POWER STRIPS

- A. Power Strips: Comply with UL 1363.
 - 1. Rack mounting.
 - 2. Six, 15-A, 120-V ac, NEMA WD 6, Configuration 5-15R receptacles.
 - 3. LED indicator lights for power and protection status.
 - 4. LED indicator lights for reverse polarity and open outlet ground.
 - 5. Circuit Breaker and Thermal Fusing: When protection is lost, circuit opens and cannot be reset.
 - 6. Circuit Breaker and Thermal Fusing: Unit continues to supply power if protection is lost.
 - 7. Cord connected with 15-foot line cord.
 - 8. Rocker-type on-off switch, illuminated when in on position.
 - 9. Peak Single-Impulse Surge Current Rating: 33 kA per phase.
 - 10. Protection modes shall be line to neutral, line to ground, and neutral to ground. UL 1449 clamping voltage for all 3 modes shall be not more than 330 V.

2.5 GROUNDING

- A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems". for grounding conductors and connectors.
- B. Telecommunications Main Bus Bar:
 - 1. Connectors: Mechanical type, cast silicon bronze, solderless exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
 - 2. Ground Bus Bar: Copper, minimum 1/4 inch thick by 4 inches wide with 9/32-inch holes spaced 1-1/8 inches apart.
 - 3. Stand-Off Insulators: Comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.
- C. Comply with ANSI-J-STD-607-A.

2.6 LABELING

- A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 - EXECUTION**3.1 ENTRANCE FACILITIES**

- A. Contact telecommunications service provider and arrange for installation of demarcation point, protected entrance terminals, and a housing when so directed by service provider.
- B. Install underground pathways complying with recommendations in TIA/EIA-569-A, "Entrance Facilities" Article.

3.2 Install underground entrance pathway complying with Division 26 Section "Raceway and Boxes for Electrical Systems".

- A. Comply with NECA 1.

SECTION 271100 – COMMUNICATIONS EQUIPMENT ROOM FITTINGS

- B. Comply with BICSI TDMM for layout and installation of communications equipment rooms.
- C. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
- D. Bundle, lace, and train conductors and cables to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.3 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping". Comply with TIA/EIA-569-A, Annex A, "Firestopping".
- B. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.4 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. Comply with ANSI-J-STD-607-A.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.
 - 1. Bond the shield of shielded cable to the grounding bus bar in communications rooms and spaces.

3.5 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements in Division 26 Section "Identification for Electrical Systems." Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
- B. See Division 27 Section "Communications Horizontal Cabling" for additional identification requirements. See Evaluations for discussion of TIA/EIA standard as it applies to this Section. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration.
- C. Labels shall be preprinted or computer-printed type.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Pathways.
- 2. UTP cabling.
- 3. Cable connecting hardware, patch panels, and cross-connects.
- 4. Telecommunications outlet/connectors.
- 5. Cabling system identification products.
- 6. Cable management system.

- B. Related Sections include the following:

- 1. Division 26 Sections:
 - a. "Common Work Results for Electrical".
 - b. "Raceways and Boxes for Electrical Systems".
 - c. "Identification for Electrical Systems".

1.3 DEFINITIONS

- A. BICSI: Building Industry Consulting Service International.
- B. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.
- C. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- D. EMI: Electromagnetic interference.
- E. IDC: Insulation displacement connector.
- F. Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
- G. LAN: Local area network.
- H. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
- I. RCDD: Registered Communications Distribution Designer.
- J. UTP: Unshielded twisted pair.

1.4 HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called "permanent link", a term that is used in the testing protocols.
 - 1. TIA/EIA-568-B.1 requires that a minimum of two telecommunications outlet/connectors be installed for each work area.
 - 2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
 - 3. Bridged taps and splices shall not be installed in the horizontal cabling.
 - 4. Splitters shall not be installed as part of the optical fiber cabling.
- B. A Work area is approximately 100 sq. ft., and includes the components that extend from the telecommunications outlet/connectors to the station equipment.
- C. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment. The maximum allowable length does not include an allowance for the length of 16 feet in the horizontal cross-connect.

1.5 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1 for Category 6, when tested according to test procedures of this standard.

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
 - 1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
 - 2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
 - 3. Cabling administration drawings and printouts.
 - 4. Wiring diagrams to show typical wiring schematics, including the following:
 - a. Cross-connects.
 - b. Patch panels.
 - c. Patch cords.
 - 5. Cross-connects and patch panels. Detail mounting assemblies and show elevations and physical relationship between the installed components.
- C. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.
- D. Source quality-control reports.
- E. Field quality-control reports.

- F. Maintenance Data: For splices and connectors to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings by an RCDD.
 - 2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician, who shall be present at all times when Work of this Section is performed at Project site.
 - 3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- B. Testing Agency Qualifications: An NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- C. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 50 or less.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.
- F. Grounding: Comply with ANSI-J-STD-607-A.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Test cables upon receipt at Project site.
 - 1. Test each pair of UTP cable for open and short circuits.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.10 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.
- B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

1.11 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Patch-Panel Units: One of each type.
 - 2. Device Plates: One of each type.

PART 2 - PRODUCTS**2.1 PATHWAYS**

- A. General Requirements: Comply with TIA/EIA-569-A.
- B. Cable Support: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
 - 2. Lacing bars, spools, J-hooks, and D-rings.
 - 3. Straps and other devices.
- C. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems". Flexible metal conduit shall not be used.
 - 1. Outlet boxes shall be no smaller than 4 inch square, and 2-1/8 inches deep. Provide all trim rings required to install in wall.

2.2 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches. Comply with requirements in Division 06 Section "Rough Carpentry" for plywood backing panels.

2.3 UTP CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Belden CDT Inc.; Electronics Division.
 - 2. Berk-Tek; a Nexans company.
 - 3. Mohawk; a division of Belden CDT.
 - 4. Nordex/CDT; a subsidiary of Cable Design Technologies.
 - 5. Superior Essex Inc.
 - 6. SYSTIMAX Solutions; a CommScope, Inc. brand.
- B. Description: 100-ohm, 4-pair UTP, covered with a thermoplastic jacket.
 - 1. Comply with ICEA S-90-661 for mechanical properties.
 - 2. Comply with TIA/EIA-568-B.1 for performance specifications.
 - 3. Comply with TIA/EIA-568-B.2, Category 6.
 - 4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
 - a. Communications, General Purpose: Type CM or CMG.
 - b. Communications, Plenum Rated: Type CMP, complying with NFPA 262.

- c. Communications, Riser Rated: Type CMR, complying with UL 1666.
 - d. Communications, Limited Purpose: Type CMX.
 - e. Multipurpose: Type MP or MPG.
 - f. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
 - g. Multipurpose, Riser Rated: Type MPR or MPP, complying with UL 1666.
- C. Color: Voice cables shall have white outer jacket. Data cables shall have blue outer jacket.

2.4 UTP CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- 1. Hubbell Premise Wiring.
 - 2. Leviton Voice & Data Division.
 - 3. Panduit Corp.
 - 4. Siemon Co. (The).
 - 5. SYSTIMAX Solutions; a CommScope, Inc. brand.
 - 6. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
- B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
- C. Connecting Blocks: 110-style IDC for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.
- D. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
- 1. Number of Terminals per Field: One for each conductor in assigned cables.
- E. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
- 1. Number of Jacks per Field: One for each four-pair UTP cable indicated.
- F. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.
- G. Patch Cords: Factory-made, four-pair cables; terminated with eight-position modular plug at each end.
- 1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.
 - 2. Patch cords shall have color-coded boots for circuit identification.
 - 3. Provide patch cables for each cable terminated on patch panels. Patch cables lengths shall be distributed as follows: 4 foot (50% of total); 7 foot (40% of total); and 10 (10% of total).

2.5 TELECOMMUNICATIONS OUTLET/CONNECTORS

- A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-B.1, Category 6.
- B. Workstation Outlets: Four-port-connector assemblies mounted in single faceplate.
 - 1. Plastic Faceplate: High-impact plastic. Coordinate color with Division 26 Section "Wiring Devices".
 - 2. For use with snap-in jacks accommodating any combination of UTP cords.
 - a. Flush mounting jacks, positioning the cord at a 45-degree angle.
 - 3. Legend: Snap-in, clear-label covers and machine-printed paper inserts.
 - 4. Voice jacks shall be white color and data jacks shall be blue color.

2.6 GROUNDING

- A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.
- B. Comply with ANSI-J-STD-607-A.

2.7 IDENTIFICATION PRODUCTS

- A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- B. Comply with requirements in Division 26 Section "Identification for Electrical Systems".

2.8 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test UTP on reels according to TIA/EIA-568-B.1.
- C. Factory test UTP cables according to TIA/EIA-568-B.2.
- D. Cable will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

- A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.2 WIRING METHODS

- A. Wiring Method: Install cables in raceways, j-hooks, and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in

attics, and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.

1. Install plenum cable in environmental air spaces, including plenum ceilings.
 2. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems".
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 INSTALLATION OF PATHWAYS

- A. Comply with requirements for demarcation point, pathways, cabinets, and racks specified in Division 27 Section "Communications Equipment Room Fittings". Drawings indicate general arrangement of pathways and fittings.
- B. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
- C. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.
- D. Install manufactured conduit sweeps and long-radius elbows whenever possible.
- E. Pathway Installation in Communications Equipment Rooms:
1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
 2. Install cable trays to route cables if conduits cannot be located in these positions.
 3. Secure conduits to backboard when entering room from overhead.
 4. Extend conduits 3 inches above finished floor.
 5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- F. Backboards: Install backboards with 96-inch dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

3.4 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
1. Comply with TIA/EIA-568-B.1.
 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices".
 3. Install 110-style IDC termination hardware unless otherwise indicated.
 4. MUTOA shall not be used as a cross-connect point.
 5. Consolidation points may be used only for making a direct connection to telecommunications outlet/connectors:

SECTION 271500 – COMMUNICATIONS HORIZONTAL CABLING

- a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
 - b. Locate consolidation points for UTP at least 49 feet from communications equipment room.
 6. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
 7. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 8. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
 9. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
 10. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
 12. In the communications equipment room, install a 10-foot-long service loop on each end of cable.
 13. Pulling Cable: Comply with BICSI ITSM, Ch. 4, "Pulling Cable". Monitor cable pull tensions.
- C. UTP Cable Installation:
1. Comply with TIA/EIA-568-B.2.
 2. Do not untwist UTP cables more than 1/2 inch from the point of termination to maintain cable geometry.
- D. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
 3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- E. Group connecting hardware for cables into separate logical fields.
- F. Separation from EMI Sources:
1. Comply with BICSI TDMM and TIA/EIA-569-A for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.

- c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
- 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
- 4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
- 5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
- 6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.5 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping".
- B. Comply with TIA/EIA-569-A, Annex A, "Firestopping".
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.6 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. Comply with ANSI-J-STD-607-A.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.7 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems".
 - 1. Administration Class: 1.
 - 2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.

- B. Using cable management system software specified in Part 2, develop Cabling Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation. At completion, cable and asset management software shall reflect as-built conditions. Identification for each component shall comply with the Owner's telecommunication standards.
- C. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
- D. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration, including optional identification requirements of this standard.
- E. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- F. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.
- G. Cable and Wire Identification:
 - 1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 - 2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
 - 3. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
 - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
 - b. Label each unit and field within distribution racks and frames.
 - 4. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- H. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.
 - 1. Cables use flexible vinyl or polyester that flex as cables are bent.

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

SECTION 271500 – COMMUNICATIONS HORIZONTAL CABLING

- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Visually inspect UTP cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
 - 2. Visually confirm Category 6, marking of outlets, cover plates, outlet/connectors, and patch panels.
 - 3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - 4. UTP Performance Tests:
 - a. Test for each outlet and MUTOA. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:
 - 1) Wire map.
 - 2) Length (physical vs. electrical, and length requirements).
 - 3) Insertion loss.
 - 4) Near-end crosstalk (NEXT) loss.
 - 5) Power sum near-end crosstalk (PSNEXT) loss.
 - 6) Equal-level far-end crosstalk (ELFEXT).
 - 7) Power sum equal-level far-end crosstalk (PSELFEXT).
 - 8) Return loss.
 - 9) Propagation delay.
 - 10) Delay skew.
 - 5. Final Verification Tests: Perform verification tests for UTP and optical fiber systems after the complete communications cabling and workstation outlet/connectors are installed.
 - a. Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.
 - b. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.
- D. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION

ADDENDA NO. 2 TO SPECIFICATIONS ISSUED FOR:

COV BID # 2025-32 CITY OF VINELAND MUNICIPAL COURT RENOVATIONS

PROPOSALS TO BE RECEIVED WEDNESDAY, OCTOBER 15, 2025, 2:00 PM PREVAILING TIME BY THE CITY OF VINELAND.

QUESTIONS & RESPONSES

- 1. Please confirm that no off-hours work will be required for any portion of the project phasing. If off-hours are required, please advise which phase we are to include off-hours work.**

The bid does not include any work to be performed outside of regular working hours. Should it be determined during construction that after-hours work is necessary, such requirements will be addressed and coordinated accordingly.

- 2. Please confirm if a fire watch is required, if COV will coordinate & pay for this, not to be paid for by contractor. This was mentioned at the pre-bid.**

The City would handle any fire watch situation if the fire alarm or fire suppression systems are shut down for construction activities.

IMPORTANT NOTICE

- Bidders must acknowledge receipt of Addendum No. 1 in the BID PACKAGE.
- Failure to acknowledge will result in automatic rejection of the bid.
- All recipients of the BID will receive a copy of this Addendum.
- The deadline for receiving bids remains unchanged.

Issued By:

Miguel A. Mercado, QPA

Purchasing Agent

City of Vineland

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Issued Date: October 3, 2025