



ADDENDUM 1

July 13, 2021

ITB TDD 58-21

DFWB Convention Center HVAC Upgrades & Restroom Renovations

This Addendum is to add the Full Set Plans & Project Manual for ITB TDD 58-21

Note: The ITB Opening Date & Time remains unchanged.

**DESTIN FORT WALTON BEACH
CONVENTION CENTER
HVAC UPGRADES & RESTROOM RENOVATIONS
FORT WALTON BEACH, FLORIDA**

PROJECT MANUAL

March 2021



Project Consultant



ARCHITECTS

**Destin Fort Walton Beach Convention Center
HVAC Upgrades & Restroom Renovations**

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Coordination with occupants.
5. Work restrictions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION

- A. Project Identification: Destin Fort Walton Beach Convention Center, HVAC Upgrades & Restroom Renovations
- B. Project Location: Destin Fort Walton Beach Convention Center – 1250 Miracle Strip Parkway SE, Fort Walton Beach, Florida 32548.
- C. Owner: Okaloosa County.
 1. Owner's Representative: Jeffrey A. Hyde, Purchasing Manager, Okaloosa County Purchasing.
- D. Architect: DAG Architects Inc. Destin, Florida.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 1. Replace conduit, wiring, fasteners and hangers that need to be replaced prior to the installation of foam insulation.
 2. Remove and reconnect power to CH-1, three Gas Duct Heaters, two Electric Duct Heaters, twenty-four Exhaust or Supply Fans, twelve VAV boxes (with electric heat).
 3. Remove and reconnect power for new VFD for one AHU and two chilled water pumps.
 4. Replace conduit/repull wire at cooling tower.
 5. Damper actuators removed and reconnected.

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6. Ceiling in the Exhibit Halls 2, 3, and 4 sections or portions removed to replace VAV boxes.
7. Replace louvers in the two second floor mechanical rooms.
8. Insulation in the parking garage.
9. New Digital Controls installed, ceiling tiles will be removed and reinstalled as necessary to complete this work.
10. TAB will be performed on all devices, ceiling tiles will be removed and reinstalled as necessary to complete this work.
11. The outdoor supports for the Cooling Tower and the PVC piping to be prepped and painted.
12. Renovate six (6) existing public restrooms, install HVAC & Ultraviolet Air Purifier Upgrades and other Work indicated in the Contract Documents.
13. And other Work indicated in the Contract Documents.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.4 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 1. Driveways, Walkways, and Entrances: Keep driveways, parking garage, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.5 PHASED CONSTRUCTION

- A. The Work shall be conducted in 3 phases, with each phase substantially complete as indicated.
- B. Before commencing Work of each phase, submit an updated copy of Contractor's construction schedule showing the sequence, commencement, and completion dates for all phases of the Work.

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1.6 COORDINATION WITH OCCUPANTS

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

1.7 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- C. Restricted Substances: Use of tobacco products and other controlled substances within the existing building is not permitted.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

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SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
 - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific

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features and requirements indicated. Indicate deviations, if any, from the Work specified.

- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.5 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

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1.6 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed unless otherwise indicated.
- C. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Substitution request is fully documented and properly submitted.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.
 - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - g. Requested substitution is compatible with other portions of the Work.

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- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

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SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

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2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

1.4 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.5 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.6 WORK CHANGE DIRECTIVE

- A. Work Change Directive: Architect may issue a Work Change Directive. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.

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1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

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SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Project meetings.
- B. Related Requirements:
 - 1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.3 DEFINITIONS

- A. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

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1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:

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1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Review: Architect will review coordination drawings to confirm that in general the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility.

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.

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13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
- C. RFI Forms: AIA Document G716 or software-generated form with substantially the same content as indicated above, acceptable to Architect].
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
 1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
 1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

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1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's CAD drawings will be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project record Drawings.
 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
 3. Contractor shall execute a data licensing agreement in the form of AIA Document C106 Digital Data Licensing Agreement.
 - a. Subcontractors, and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of AIA Document C106.
- B. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
- B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.

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- h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Sustainable design requirements.
 - o. Preparation of Record Documents.
 - p. Use of the premises and existing building.
 - q. Work restrictions.
 - r. Working hours.
 - s. Owner's occupancy requirements.
 - t. Responsibility for temporary facilities and controls.
 - u. Procedures for moisture and mold control.
 - v. Procedures for disruptions and shutdowns.
 - w. Construction waste management and recycling.
 - x. Parking availability.
 - y. Office, work, and storage areas.
 - z. Equipment deliveries and priorities.
 - aa. First aid.
 - bb. Security.
 - cc. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, and Owner of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Sustainable design requirements.
 - i. Review of mockups.
 - j. Possible conflicts.
 - k. Compatibility requirements.
 - l. Time schedules.

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- m. Weather limitations.
 - n. Manufacturer's written instructions.
 - o. Warranty requirements.
 - p. Compatibility of materials.
 - q. Acceptability of substrates.
 - r. Temporary facilities and controls.
 - s. Space and access limitations.
 - t. Regulations of authorities having jurisdiction.
 - u. Testing and inspecting requirements.
 - v. Installation procedures.
 - w. Coordination with other work.
 - x. Required performance results.
 - y. Protection of adjacent work.
 - z. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at weekly intervals.
- 1. Coordinate dates of meetings with preparation of payment requests.
 - 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.

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- 4) Status of submittals.
 - 5) Status of sustainable design documentation.
 - 6) Deliveries.
 - 7) Off-site fabrication.
 - 8) Access.
 - 9) Site use.
 - 10) Temporary facilities and controls.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) Status of RFIs.
 - 16) Status of Proposal Requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

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SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner or authorities having jurisdiction are not limited by provisions of this Section.

1.2 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
 - 2. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as indicated in-place portions of permanent construction, consisting of multiple products, assemblies, and subassemblies, with cutaways enabling inspection of concealed portions of the Work.
 - a. Include each system, assembly, component, and part of the exterior wall to be constructed for the Project. Colors of components shall be those selected by the Architect for use in the Project.

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3. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
 4. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
- E. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall have the same meaning as testing agency.
- H. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- I. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.3 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Statement: Submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

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1.4 CONFLICTING REQUIREMENTS

- A. **Conflicting Standards and Other Requirements:** If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.
- B. **Minimum Quantity or Quality Levels:** The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

- A. **Mockup Shop Drawings:** For integrated exterior mockups.
 - 1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
 - 2. Indicate manufacturer and model number of individual components.
 - 3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. **Contractor's Statement of Responsibility:** When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- B. **Testing Agency Qualifications:** For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- C. **Permits, Licenses, and Certificates:** For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.7 REPORTS AND DOCUMENTS

- A. **Test and Inspection Reports:** Prepare and submit certified written reports specified in other Sections. Include the following:

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1. Date of issue.
 2. Project title and number.
 3. Name, address, telephone number, and email address of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Statement on condition of substrates and their acceptability for installation of product.
 2. Statement that products at Project site comply with requirements.
 3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 5. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Statement that equipment complies with requirements.
 2. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 3. Other required items indicated in individual Specification Sections.
- 1.8 QUALITY ASSURANCE
- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

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- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

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1.9 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform duties of Contractor.

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- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 6. Security and protection for samples and for testing and inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.

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- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and authorities' having jurisdiction reference during normal working hours.
 - 1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

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SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.3 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- D. Moisture-and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.

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- E. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
1. Locations of dust-control partitions at each phase of work.
 2. HVAC system isolation schematic drawing.
 3. Location of proposed air-filtration system discharge.
 4. Waste-handling procedures.
 5. Other dust-control measures.

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 2. Drinking water and private toilet.
 3. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).

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4. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures."]
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

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

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3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to private system indicated as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
 - 1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
- G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service overhead unless otherwise indicated.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.4 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:

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1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E136. Comply with NFPA 241.
 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- D. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 3. Maintain and touch up signs so they are legible at all times.
- E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."
- F. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- G. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.
- 3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION
- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

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1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- D. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- E. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- F. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- G. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- I. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
 2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 3. Provide walk-off mats at each entrance through temporary partition.

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- J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 3. Indicate methods to be used to avoid trapping water in finished work.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
1. Protect porous materials from water damage.
 2. Protect stored and installed material from flowing or standing water.
 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard and replace stored or installed material that begins to grow mold.

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7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

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SECTION 016000 - PRODUCT REQUIREMENTS

1.1 ACTION SUBMITTALS

- A. Comparable Product Requests: Architect will notify Contractor of approval or rejection within 15 days of receipt of request, or seven days of receipt of additional information.

1.2 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Use means and methods that will prevent damage, deterioration, and loss, including theft.
- B. Store products to allow for inspection and measurement or counting of units.
- C. Provide for storage of materials and equipment by Owner.

1.3 PRODUCT WARRANTIES

- A. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1.4 PRODUCT SELECTION PROCEDURES

- A. Product Selection Procedures:
 - 1. Product: Product named that complies with requirements.
 - 2. Manufacturer/Source: Product by manufacturer or from source named that complies with requirements.
 - 3. Products: One of the products listed that complies with requirements. Comparable products will be considered unless otherwise indicated.
 - 4. Manufacturers: Product by one of the manufacturers listed that complies with requirements. Comparable products will be considered unless otherwise indicated.
 - 5. Basis-of-Design Product: Either the specified product or a comparable product by one of the other named manufacturers.
 - 6. Visual Matching Specification: Product that matches Architect's sample. Architect's decision will be final.
 - 7. Visual Selection Specification: Product (and manufacturer) that complies with other specified requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

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1.5 COMPARABLE PRODUCTS

A. Conditions for Consideration:

1. Product does not require revisions to the Contract Documents, is consistent with the Contract Documents and will produce the indicated results, and is compatible with other portions of the Work.
2. Comparison of proposed product with those named in the Specifications.
3. Product provides specified warranty.
4. Similar installations, if requested.
5. Samples, if requested.

END OF SECTION 016000

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SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Progress cleaning.
 - 6. Starting and adjusting.
 - 7. Protection of installed construction.

- B. Related Requirements:
 - 1. Section 011000 "Summary" for limits on use of Project site.

1.2 INFORMATIONAL SUBMITTALS

- A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.3 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

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4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of utilities, mechanical and electrical systems, and other construction affecting the Work.
 1. Before construction, verify the location and points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

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- C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings. If discrepancies are discovered, notify Architect promptly.
- B. General: Lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.

3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.

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2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Remove and replace damaged, defective, or non-conforming Work.

3.5 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

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1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize or prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

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2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

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- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

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SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of site, building or structure.
2. Demolition and removal of selected system elements.
3. Salvage of existing items to be reused or recycled.

1.2 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.3 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Survey: Submit survey of conditions of the building and systems to be replaced.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.
- C. Schedule of selective demolition activities with starting and ending dates for each activity.
- D. Predemolition photographs or video.

1.5 CLOSEOUT SUBMITTALS

- A. Inventory of items that have been removed and salvaged.

1.6 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

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- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.
- G. Arrange selective demolition schedule so as not to interfere with Owner's operations.

1.7 WARRANTY

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

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- B. Perform a survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
- C. Inventory and record the condition of items to be removed and salvaged.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

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

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
- C. Remove temporary barricades and protections where hazards no longer exist.

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3.4 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 4. Maintain fire watch during and for at least 24 hours after flame-cutting operations.
 5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 6. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

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3.5 CLEANING

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn demolished materials.
- C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

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SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Glass-fiber blanket.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Low-emitting product certification.

1.3 INFORMATIONAL SUBMITTALS

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

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET

- A. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
 - 1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
 - 2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.
 - 3. Low Emitting: Complies with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.2 ACCESSORIES

- A. Insulation for Miscellaneous Voids:

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- B. Insulation Anchors, Spindles, and Standoffs: To prevent sagging and movement as recommended by manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

3.2 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

END OF SECTION 072100

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SECTION 072119 - FOAMED-IN-PLACE INSULATION

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. Closed-cell spray polyurethane foam.
 - 2. Intumescent Coating

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Evaluation Reports: For each product, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 CLOSED-CELL SPRAY POLYURETHANE FOAM

- A. Closed-Cell Spray Polyurethane Foam: ASTM C1029, Type II, minimum density of 1.5 lb/cu. ft. (24 kg/cu. m) and minimum aged R-value at 1-inch (25.4-mm) thickness of 6.2 deg F x h x sq. ft./Btu at 75 deg F (43 K x sq. m/W at 24 deg C).

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1. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.2 INTUMESCENT COATING

- A. Intumescent coating approved as an Alternative Barrier System, applied over SPF and tested to the criteria of NFPA 286, UL 1715 or ISO-CAN/ULC 9705 for duration of 15-20 minutes by an accredited fire testing facility.
- B. Coating must be approved for installation in high humidity and unconditioned exterior spaces.
- C. Color as selected by architect from full range of manufacture's colors available.

2.3 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.
- B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.
- C. Mask or seal piping, hangers or other penetrations as required and recommended by insulation manufacturer.

3.2 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Spray insulation to envelop entire area to be insulated and fill voids. Apply intumescent coating over all exposed SPF surfaces in accordance with manufacturer's written instructions.

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- C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.
- D. Miscellaneous Voids: Apply according to manufacturer's written instructions.

3.3 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

PART 4 – SCHEDULE

- A. Two (2) inch cured thickness foamed in place insulation with intumescent coating under slabs as designated on Mechanical Sheets for the parking garage ceiling.

END OF SECTION 072119

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SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Mildew-resistant joint sealants.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples: For each kind and color of joint sealant required.
- C. Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
 2. Joint-sealant manufacturer and product name.
 3. Joint-sealant formulation.
 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Preconstruction laboratory test reports.
- C. Preconstruction field-adhesion-test reports.
- D. Field-adhesion-test reports.
- E. Sample warranties.

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1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C1021 to conduct the testing indicated.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Adhesion Testing: Use ASTM C794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Compatibility Testing: Use ASTM C1087 to determine sealant compatibility when in contact with glazing and gasket materials.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.

1.7 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

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2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.

2.3 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C1248.
- B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.

2.4 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
- C. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove laitance and form-release agents from concrete.

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2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 1. Provide concave joint profile per Figure 8A in ASTM C1193 unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform one test for each 50 feet of joint length.
 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.

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- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces].
1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of walls.
 - b. Tile control and expansion joints.
 - c. Vertical joints on exposed surfaces of walls and partitions.
 - d. Other joints as indicated on Drawings.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - c. Other joints as indicated on Drawings.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

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SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access doors and frames for walls and ceilings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each door face material.
- D. Schedule: Types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 tested according to the following test method:
 1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
 2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
 1. Acudor Products, Inc.
 2. Activar, Inc.
 3. Larsen's Manufacturing Company.
 4. Milcor Inc.

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- C. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- D. Flush Access Doors with Exposed Flanges:
1. Basis-of-Design Product: Milcor Inc
 2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
 3. Locations: Wall.
 4. Uncoated Steel Sheet for Door: 16 gage.
 - a. Finish: Factory prime;
 5. Frame Material: Same material, thickness, and finish as door
 6. Hinges: Manufacturer's standard.
 7. Hardware: Latch.
- E. Flush Access Doors with Concealed Flanges:
1. Basis-of-Design Product: Milcor Inc.
 2. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board beads for concealed flange installation.
 3. Locations: Ceiling.
 4. Uncoated Steel Sheet for Door: 16 gage
 - a. Finish: Factory prime.
 5. Frame Material: Same material and thickness as door.
 6. Hinges: Manufacturer's standard
 7. Hardware: Latch.
 8. Fire-Rated, Flush Access Doors with Exposed Flanges
- F. Flush Access Doors with Fire Rating
1. Basis-of-Design Product: Activar, Inc.
 2. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
 3. Locations: Wall and ceiling.
 4. Fire-Resistance Rating: Not less than 1 hour or as scheduled.
 5. Temperature-Rise Rating: 450 deg F (250 deg C) at the end of 30 minutes'
 6. Uncoated Steel Sheet for Door: 20 gage.
 7. Finish: Factory prime.
 8. Frame Material: Same material, thickness, and finish as door.
 9. Hinges: Manufacturer's standard.
 10. Hardware: Latch.
 11. Latch: Cam

2.3 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

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- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Steel and Metallic-Coated-Steel Finishes:
 - 1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

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SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

1.4 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

PART 2 - PRODUCTS

2.1 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
2. Protective Coating: ASTM A653/A653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.

B. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.

1. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection.
2. Depth: As indicated on Drawings

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- C. Slip-Type Head Joints: Where indicated, provide one of the following:
1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing minimum vertical movement.
 2. Single Long-Leg Track System: ASTM C645 top track with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
 3. Double-Track System: ASTM C645 top outer tracks, inside track with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
 4. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Steel Thickness 0.0329 inch (0.836 mm).
- E. Cold-Rolled Channel Bridging: Steel, 0.0538-inch (1.367-mm) minimum base-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
1. Depth: 1-1/2 inches (38 mm).
 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C645.
1. Minimum Base-Steel Thickness 0.0329 inch (0.836 mm).
 2. Depth: 1-1/2 inches (38 mm).
- G. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), minimum uncoated-steel thickness of 0.0179 inch (0.455 mm), and depth required to fit insulation thickness indicated.

2.2 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
- B. Hanger Attachments to Concrete:
1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES or AC308 as appropriate for the substrate.
 - a. Uses: Securing hangers to structure.
 - b. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5, unless otherwise indicated.

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- C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.
- D. Flat Hangers: Steel sheet, 1 by 3/16 inch (25 by 5 mm) by length indicated.
- E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch (1.367 mm) and minimum 1/2-inch- (13-mm-) wide flanges.
 - 1. Depth: 2 inches (51 mm).
- F. Furring Channels (Furring Members):
 - 1. Cold-Rolled Channels: 0.0538-inch (1.367-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
 - 2. Steel Studs and Tracks: ASTM C645.
 - a. Minimum Base-Steel Thickness: 0.0329 inch (0.836 mm).
 - b. Depth: 3-5/8 inches (92 mm).
 - 3. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch (22 mm) deep.
 - a. Minimum Base-Steel Thickness: 0.0329 inch (0.836 mm).

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls:
 - 1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
 - 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C841 that apply to framing installation.
 - 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C1063 that apply to framing installation.
 - 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C844 that apply to framing installation.

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4. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.2 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

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- a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (150 mm) o.c.
- E. Direct Furring:
 1. Screw to wood framing.
 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
- F. Z-Shaped Furring Members:
 1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced [24 inches (610 mm)] <Insert dimension> o.c.
 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (305 mm) from corner and cut insulation to fit.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.3 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

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2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.
 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Installation Tolerances: Install suspension systems that are level to within 1/8 inch (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

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SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X: ASTM C1396/C1396M.

1. Thickness: 5/8 inch (15.9 mm).
2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

- B. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch (15.9 mm), Type X]
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.3 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:
 - a. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - b. L-Bead: L-shaped; exposed long flange receives joint compound.
 - c. U-Bead: J-shaped; exposed short flange does not receive joint compound.

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- d. Expansion (control) joint.

2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - 3. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels:
 - 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
 - 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

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PART 3 - EXECUTION**3.1 APPLYING AND FINISHING PANELS**

- A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- B. Comply with ASTM C840.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- D. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- E. Prefill open joints and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
 - 1. Level 1: Ceiling plenum areas, concealed areas.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 5: Exposed walls.
- H. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.
- I. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.2 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

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SECTION 093013 - PORCELAIN TILING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Porcelain floor and wall tile.
 2. Tile backing panels.
 3. Waterproof membrane for thinset applications.
 4. Crack isolation membrane.
 5. Metal edge strips.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples:
1. Each type and composition of tile and for each color and finish required.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
1. Installer is a Five-Star member of the National Tile Contractors Association.
 2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.

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3. Installer employs only Porcelain Tile Education Foundation Certified Installers for Project.
 4. Installer employs at least one installer for Project that has completed the Advanced Certification for Tile Installers (ACT) certification for installation of membranes porcelain tile and large format tile.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Porcelain Tile Standard: Provide Standard-grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

2.2 TILE PRODUCTS

- A. Porcelain Tile Type PT-1: Porcelain Honed or "Nature" (as referred to by manufacturer) floor and wall tile.
 1. Composition: porcelain
 2. Certification: Porcelain tile certified by Urbatek Porcelanosa Group.
 3. Module Size: 12"x 24"
 4. Thickness: 7/16" thick approx.
 5. Face: Plain [tone variations 3]
 6. Surface: Nature- slip resistance
 7. Dynamic Coefficient of Friction: Not less than 0.56. Friction wet- 0.56 and Friction when dry 0.75
 8. Finish: Nature
 9. Tile Color and Pattern: Avenue Grey Nature 100143115-c220400321
 10. Grout Color: Tac color 929 charcoal grey (or similar)
 11. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base Cove: Cove, module size
 - b. Base Cap:
 - c. Wainscot Cap:
 - d. Internal Corners:

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- e. Tapered Transition Tile: Shape designed to effect transition between thickness of tile floor and adjoining floor finishes of different thickness, tapered to provide reduction in thickness from

2.3 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 - 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to **1/16 inch (1.5 mm)** above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to **1/4 inch** or less above adjacent floor surface.
- B. Marble Thresholds: ASTM C503/C503M, with a minimum abrasion resistance of **10** according to ASTM C1353 or ASTM C241/C241M and with honed finish.
 - 1. Description: Uniform, fine- to medium-grained white stone with gray veining.

2.4 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C1325, Type A.
 - 1. Thickness: **5/8 inch (15.9 mm)**.

2.5 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

2.6 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

2.7 SETTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.
- B. Standard Dry-Set Mortar (Thinset): ANSI A118.1.
 - 1. For wall applications, provide nonsagging mortar.

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2.8 GROUT MATERIALS

- A. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated.
 - 1. Mapei color: 47 charcoal

2.9 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for wall and flooring applications
- C. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with bonded mortar bed or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

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- B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped **1/4 inch per foot (1:50)** toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION

- A. Comply with TCNA's "Handbook for Porcelain, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Porcelain Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors consisting of tiles **8 by 8 inches (200 by 200 mm)** or larger.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
- G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Glass Tile: **1/16 inch (1.6 mm)**.
 - 2. Porcelain Tile: **1/16 inch (6.4 mm)**.

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- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
 - 1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in modified dry-set mortar (thinset).
 - 2. Do not extend waterproof membrane or [crack isolation membrane under thresholds set in standard dry-set mortar. Fill joints between such thresholds and adjoining tile set on waterproof membrane or crack isolation membrane with elastomeric sealant.
- J. Metal Edge Strips: Install at locations indicated. Schluter metal transition strips at wall and floor transition. Schluter metal edge protection at outside corners.
- K. Floor Sealer: Apply floor sealer to cementitious grout joints in tile wall and floors] according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- L. Install tile backing panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.
- M. Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
- N. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

3.4 INTERIOR PORCELAIN TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 - 1. Porcelain Tile Installation: TCNA F111 and ANSI A108.1A; cement mortar bed (thickset) with cleavage membrane.
 - a. Bond Coat for Cured-Bed Method: Standard dry-set mortar.
 - b. Grout: Sand-portland cement.
- B. Interior Wall Installations, Wood or Metal Studs or Furring:
 - 1. Porcelain Tile Installation: TCNA W221 and ANSI A108.1A over waterproof membrane on solid backing.
 - a. Bond Coat for Wet-Set Method: Standard dry-set mortar.

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- b. Grout: Sand-portland cement.

END OF SECTION 093013

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SECTION 093123 – Thin-Set Glass Tiling

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Glass tile.
 - 2. Surface preparation products.
 - 3. Tile setting mortars and adhesives.
 - 4. Grout for tile.
 - 5. Waterproofing membrane for tile

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Manufacturer Installation Instructions
- C. Samples:
 - 1. Each type and composition of tile and for each color and finish required.
 - 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:

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1. Installer is a Five-Star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.
2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.
3. Installer employs only Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers for Project.
4. Installer employs at least one installer for Project that has completed the Advanced Certification for Tile Installers (ACT) certification for installation of mud floors, gauged porcelain tile/gauged porcelain tile panels and large format tile.

B. Source

1. To ensure warranty requirements and compatibility of products; provide all tile grout, setting materials, additives, accessories, and factory-prepared dry-set mortars from the same manufacturer.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Prevent damage or contamination to materials by water, freezing, foreign matter or other causes.
- B. Do not use frozen materials unless specifically allowed by manufacturer.
- C. Deliver and store materials on site at least 24 hours before work begins.
- D. Provide heated and dry storage facilities on site.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during, and after installation.
- B. For interior applications:
 1. Do not begin installation until building is completely enclosed and maintaining temperature and humidity conditions consistent with "after occupancy" conditions for a minimum of 2 weeks.
 2. Maintain continuous and uniform building temperatures of not less than 10 degrees C (50 degrees F) during installation.

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3. Ventilate spaces receiving tile in accordance with material manufacturer's instruction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. MAPEI, Inc. Canada, 2900 Francis-Hughes, Laval, PQ, Canada, H7L3J5. Toll Free Tel: 800-361-9309; Tel: 450-662-1212; Fax: 450-662-0444; Email: TServicesCA@mapei.com; Web: www.mapei.ca.
- B. MAPEI Americas U.S.A., 1144 E. Newport Center Rd., Deerfield Beach, FL 33442; ASD. Toll Free Tel: 800-42-MAPEI; Tel: 954-246-8888; Fax: 954-246-8801; Email: mapeitechsvcs@mapei.com; Web: www.mapei.us.
- C. Substitutions: Not permitted.

2.2 SUBSTRATE MATERIALS

- A. Steel Framing: Non-corrosive load-bearing C-type steel studs conforming to ASTM C955 and rigid furring channels for screw application of Cementitious Backer Unit. Minimum base metal thickness and individual measurement shall be not less than 20 Gauge (0.84 mm or 0.033 inch).
- B. Water Resistant Gypsum Backing Board: Glass-Mat, Water-Resistant Backing Board: ASTM C1178/C1178M, with manufacturer's standard edges.
 1. Core: 5/8 inch (15.9 mm), Type X.
 2. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.3 GLASS TILE

- A. Impervious Glass Tiles: Bodesi glass mosaics, face-mounted (4x12, Hand painted series, color Peacock 80), as manufactured in Canada by Bodesi Glass Tile, 2076 192 St #104, Surrey, BC V3Z 0N2 and provided in Canada by manufacturer Bodesi Tile. Bo Wojityra, 1 888 658 2488, Info@bodesi.com

2.4 WALL RENDERING MORTAR

- A. MAPEI's Planitop 330 Fast, quick-setting, fiber-reinforced, cementitious rendering mortar applied from 3 mm to 3.2 cm (0.125 inch to 1.25 inches) thick.

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2.5 SELF-LEVELING UNDERLAYMENTS

- A. MAPEI's Novoplan 2 Plus, professional self-leveling underlayment for smoothing and repairing interior floors before the installation of floor coverings applied from 3 mm to 2.5 cm (0.125 inch to 1 inch) thick. Requires a MAPEI primer.
- B. MAPEI's Ultraplan 1 Plus, high-performance, quick-setting, self-leveling underlayment, for smoothing and repairing interior floors before the installation of floor coverings applied from featheredge to 3.8 cm (1.5 inch) thick. Requires a MAPEI primer.

2.6 SELF-LEVELING UNDERLAYMENT AND GYPSYM DRYWALL LATEX PRIMER

- A. MAPEI's Primer T, all-purpose, low odor primer.

2.7 WATERPROOFING MEMBRANE

- A. MAPEI's Mapelastix 315, trowel-applied professional cement-based waterproofing complying with ANSI A118.10 and having IAPMO certification as a shower pan liner.
 - 1. MAPEI's Fiberglass Mesh, ready-to-use, strong, flexible, alkali-resistant mesh for embedment with waterproofing and crack-isolation membranes.

2.8 GROUTS:

- a. Mapei color: 93 Warm Gray (or similar)
- b. Alternate option: Tec Color- 949 Silverado
- B. MAPEI's Keracolor U, unsanded polymer-modified Portland cement ceramic tile grout, complying with ANSI A118.6 and ISO 13007 CG2WA, for joints between 1.5 mm and 3 mm (0.0625 inch to 0.125 inch) wide.
 - 1. Color: TBD Mapei 93 warm grey or similar.

TILE-SETTING MORTARS

- C. MAPEI's Adesilex P10, single-component, bright white, polymer-modified thin-set glass tile mortar with non-sag properties; complying with ANSI A118.4 and ISO 13007 C2TE.
 - 1. Can be mixed with MAPEI's Keraply in lieu of water; complying with ANSI A118.4, ANSI A118.11 and ISO 13007 C2TES1P1.

2.9 FLEXIBLE SEALANT

- A. MAPEI's Mapesil T, professional-grade, 100-percent silicone sealant specifically formulated for heavy traffic for expansion/movement joints complying with ASTM standards; slump (ASTM C639), Tack-Free time (ASTM C679,) shore "A" hardness (ASTM C661), joint movement (ASTM C920), elongation at break (ASTM D412), flexibility (ASTM C734) and passes weatherability (Accelerated Weathering Tester QUV).

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B. MIXES

1. Proportion and mix materials in accordance with manufacturer's most current written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. The concrete substrate shall be completely cured, solid, sound and shall have a direct tensile cohesive strength greater than 1.21 MPa (175 psi) when tested in accordance with ACI 503R Appendix A procedure.
3. Concrete must not exceed a Water Vapour Emission Rate (MVER) of 1.36 kg per 92.9 square metres (3 pounds per 1000 square feet) per 24 hours when tested per ASTM F1869 or a Relative Humidity (RH) not exceeding 75 percent when tested per ASTM F2170. When Mapelastic AquaDefense is used, the MVER limit is 3.63 kg per 92.9 square metres (8 pounds per 1000 square feet) per 24 hours when tested per ASTM F1869 and the RH limit is 85 percent when tested per ASTM F2170.
4. On-grade or below-grade concrete slabs must be installed over an effective vapour barrier. The on-going presence of free water under the bottom of the surface of the tile must be avoided in order to prevent the unleashing of potentially damaging chemical reaction or staining.
5. Prior to installation, set aside for further inspection and replacement on a tile for tile basis by the tile supplier, all sub-standard tiles, fractured tiles or tiles with chipped corners, pinholes or voids that are unusable for cuts. The installer shall replace at his own expense, without any charge to the architect, owner, tile supplier or manufacturer, all sub-standard and pre-damaged tiles once they are installed.
6. Carefully select, set aside and shade-mix the tiles to a homogeneous blend throughout. During installation, provide supplementary lighting equipment if necessary to easily identify shade differences, which are normally very slight or inexistent, and provide a standard even aesthetic blend effect. This is best achieved by using a strong floodlight or spotlight fitted to a movable pole stand immediately over the work area.
7. Before setting, examine tile backs for possible dust or other contaminants. If necessary, use a slightly damp towel and wipe the tile backs to remove any such dust or contaminant residue.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

A. Concrete:

1. Perform surface preparation in compliance with the most recent ICRI Technical Guideline No. 310.2R. Concrete must be clean and textured. All oil, dirt, debris, paint and unsound concrete must be removed. The surface must be prepared mechanically using a diamond-cup grinder or other engineer-approved methods, to produce a surface profile matching CSP 3 per ICRI 310.2R.
2. If the concrete is excessively dry or porous, pre-moisten the concrete substrate before work begins. Remove all excess water or standing water allowing the surface to become saturated surface dry (SSD) before installing the leveling coat or tile-setting mortar.

B. Gypsum Drywall Panels:

1. Prime the substrate surface with Primer T (diluted to a 2 parts of water per 1 part of Primer T) using a 10 mm (0.375 inch) nap roller. Let dry for 3 to 4 hours.

C. If wall rendering is required:

1. If installing over concrete walls or cement-block masonry walls, the substrate surface must be clean and porous with a minimum concrete surface profile (CSP) of 2. Substrate surfaces should be saturated surface-dry (SSD).
2. If installing over new gypsum wallboard or substrate containing gypsum patching compound, prime the substrate surface with Primer T (diluted to a 2 parts of water per 1 part of Primer T) using a 10 mm (0.375 inch) nap roller. Let dry for 3 to 4 hours.
3. Apply a thin skimcoat/bonding layer of Planitop 330 Fast into the substrate with a flat trowel. Immediately apply a build layer of Planitop 330 Fast into the fresh skimcoat at the thickness required to level and even the substrate in a single layer, up to a maximum of 3.2 cm (1.25 inches).
4. Let Planitop 330 Fast cure for at least 24 hours based at 21 degrees C (70 degrees F) before applying a waterproofing membrane or setting tiles.

D. If floor leveling is required:

1. The substrate surface temperature must be at least 2.8 degrees C (5 degrees F) above the dew point to avoid condensation on the substrate surface as Primer T dries.
2. On absorbent surfaces, dilute Primer T with water at a ratio of 1:1 to 2:1 (water to primer). On non-absorbent surfaces, use Primer T undiluted.
3. Apply Primer T with a 10 mm (0.375 inch) nap roller working it into the surface. Do not puddle.
4. Let dry 3 hours and up to 24 hours based at 23 degrees C (73 degrees F) before application of a self-leveling underlayment. If the primer remains uncovered for more than 24 hours, re-apply a second undiluted coat and install the self-leveling underlayment within the correct application window.
5. Close doors and windows and turn off HVAC systems to prevent drafts during application and until the self-leveling underlayment is cured. Adjust ventilation system to prevent air movement across surface. Protect areas from direct sunlight.
6. Quickly pour the mixed self-leveling underlayment onto the properly prepared and primed surface in a ribbon pattern.
7. Set the width of the pour at a distance that is ideal for maintaining a wet edge throughout placement and in consideration of expansion and control joints.

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8. Provide a continuous flow of wet material which will help to prevent trapping air or creating a cold joint.
9. Shortly after placing the self-leveling underlayment, spread the material with a gauge rake to assist in gauging out the self-leveling underlayment to the desired depth. After achieving the desired depth, smooth the surface with a smoother to obtain evenness.
10. All existing expansion joints, isolation joints, construction joints and control joints, as well as any moving cracks, must be honored up through the self-leveling underlayment.
11. Let Novoplan 2 Plus cure for 24 hours before installing tile or 48 to 72 hours before installing a waterproofing membrane based at 21 degrees C (70 degrees F) Let Ultraplan 1 Plus cure 3 to 4 hours before installing tile or 16 to 24 hours before installing a waterproofing membrane, based at 21 degrees C (70 degrees F).

3.3 INSTALLATION

A. Waterproofing Membrane:

1. Set aside pre-cut sections of the Reinforcing Fabric.
2. Apply a generous coat of Mapelastic AquaDefense liquid on corners, coves, drains and penetration with a paintbrush. Incorporate MAPEI's Reinforcing Fabric immediately in the fresh coat of Mapelastic AquaDefense and remove the excess of material with an appropriate tool. The Reinforcing Fabric should be bed in the waterproofing membrane at 100 percent and immediately recovered with another coat of Mapelastic AquaDefense. Reinforcing Fabric should be perfectly installed at a 90 degree angle in the corners. When using Reinforcing Fabric avoid air pockets, bubbles or excess of material behind it (see technical data sheet for further instructions). Reinforcing Fabric must be at least 5 cm (2 inches) overlapped during the application process.
3. Apply Mapelastic AquaDefense on the areas to be waterproofed using a 10 mm (0.375 inch) nap roller. Let the Mapelastic AquaDefense dry for 30 to 50 minutes (0.375 inch) nap roller.

B. Mapelastic 315:

1. Set aside pre-cut sections of the Fiberglass Mesh.
2. Key a liberal amount of Mapelastic 315 using the trowel's flat side into the corners, coves, drains and penetration.
3. Immediately apply additional Mapelastic 315 and comb with a 4.5 mm by 4 mm (0.1875 inch by 0.1562 inch) v-notch trowel.
4. Embed the pre-cut sections of Fiberglass Mesh into the fresh Mapelastic 315. Lap all seams and ends in the Fiberglass Mesh by 5 cm (2 inches).
5. Using the trowel's flat side, immediately flatten the material to a smooth, voidless membrane with a thickness of up to 2 mm (0.078 inch).
6. Let the Mapelastic 315 cure 4 to 6 hours based at 23 degrees C (73 degrees F). Install Mapelastic 315 over the entire area to be waterproofed following steps 2 to 5 above.
7. Let the Mapelastic 315 cure 8 to 12 hours based at 23 degrees C (73 degrees F). Apply Mapesil T over the Mapelastic 315 membrane to secure waterproofing accessories (drains, water outlet) to ensure perfect waterproofing.

C. Tile-Setting Mortar:

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1. Choose a typical notched trowel with sufficient depth to achieve more than 95 percent mortar contact to both the tile and substrate. It may be necessary to backbutter the tile in order to meet these requirements.
 2. With pressure, apply a coat by using the trowel's flat side to key mortar into the substrate. Apply additional mortar, combing it in a single direction with the trowel's notched side. Spread only as much mortar as can be tiled before the product skins over. Open time can vary with jobsite conditions.
 3. Place the tiles firmly into the wet mortar. Push the tiles back and forth in a direction perpendicular to trowel lines, to collapse the mortar ridges and to help achieve maximum coverage. Ensure proper contact between mortar, tile, and substrate by periodically lifting a few tiles to check for acceptable coverage.
 4. Remove excess mortar from the joint areas so that at least two thirds of the tile depth is available for grouting.
 5. Let regular-setting tile mortar cure for at least 24 hours before grouting and fast-setting tile mortar cure for at least 3 to 4 hours before grouting.
 6. Provide for expansion and control joints in accordance with TTMAC 301MJ method.
- D. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Glass tile- 1/16 inch (6.4mm).
- E. Grouting:
1. When grouting with sanded cement grouts, pigmented grouts and epoxy grouts, special care and precautions must be taken to prevent staining, scratching, dulling or otherwise damaging the tile appearance.
 2. Keracolor U and Ultracolor Plus FA:
 - a. Force grout into the joints with a rubber grout float. Make sure all joints are well-compacted and free of voids and gaps.
 - b. Remove excess grout from the tile surface, moving the grout float diagonally to the joints while the grout is still fresh.
 - c. The grout surface should be flush with the tile edge.
 - d. Allow the grout to firm up in the joints sufficiently to avoid damaging the grout surface, usually in 15 to 30 minutes, depending upon the temperature, humidity and absorption rate of the tile.
 - e. Use two buckets of cleaning water: one for rinsing the majority of the grout residue from the grout sponge, and one for moistening the sponge in clean water.
 - f. Dip the sponge in a bucket of water and wring out the excess, so that the sponge does not drip water. Using very little pressure, pull the sponge diagonally across the grout joints to remove the excess grout from the tile surface. Also use the sponge to smooth the surface of the grout joint. Turn the sponge over and make another pass in an adjacent area. After using both sides, rinse the sponge in one bucket and wring out the excess water. Dip the sponge in the second bucket of water, wringing out the excess and continue the process.
 - g. Change the water in the buckets frequently to help limit the amount of haze that forms on the tile surface.
 - h. To control color variations, buff the grouted surface with cheesecloth or a clean, dry cotton cloth when a haze is visible on the tile surface, usually 30 to 60 minutes after grouting. This should remove any remaining surface water or grout residue.
- F. Kerapoxy CQ:

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1. Remove mixed product from the container and place it in small piles. (If grouting a wall, place the product on kraft paper laid on the floor.) Kerapoxy CQ is a thermosetting product, so that it sets up faster in a container or in a large mass.
 2. Use a hard-rubber float with a sharp edge to force the grout into the joints in a continuous manner, leaving it flush with the tile edge. Make sure all joints are well-compacted and free of voids and gaps.
 3. Remove excess grout from the tile surface, moving the grout float diagonally to the joints while the grout is still fresh.
 4. Apply a liberal amount of cold water to the freshly grouted area. Scrub the tile surface diagonally to the joint line using a nonwoven nylon white scouring pad (use a more aggressive pad if tile has an abrasive surface). Apply enough pressure on the pad to loosen any film without removing grout from the joints. Rinse pads frequently while cleaning. Be careful not to get any water in the ungrouted joints.
 5. To remove the loosened epoxy residue and water, drag a clean sponge diagonally across the tile surface. Use one side of the sponge for each pass over the tile, rinsing the sponge following the second pass and regularly changing water in the buckets to avoid residue buildup.
 6. Do not allow excess water to remain on the tile surface, which would allow a film to form on the surface that would be difficult to remove once hardened.
 7. Within 15 to 20 minutes perform a final wash. To aid in the cleaning process, 30 ml (1 U.S. ounce) of clear dishwashing soap may be added to a 11.4 L (3 U.S. gallon) pail of clean water. Next, use a clean nonwoven nylon white scouring pad to loosen any remaining residue left on the tile from the first wash. Then follow the same cleaning process.
- G. MAPEI Flexcolor CQ and 3D:
1. Grout small areas of between 2.79 to 3.72 square metres (30 to 40 square feet) at a time, so that cleaning can begin before the grout skins over and dries on the tile surface.
 2. To aid in spreading MAPEI Flexcolor CQ and 3D, slightly moisten the tile surface with a damp, rounded grout sponge just before application.
 3. Force MAPEI Flexcolor CQ and 3D into the joints with a medium- to hard-rubber grout float held at a 45-degree angle to the tile surface. Make sure all joints are well-compacted and free of voids and gaps.
 4. Remove excess grout from the tile surface, holding the grout float at an almost 90-degree angle to the surface and moving the grout float diagonally to the joints while the grout is still fresh.
 5. The grout surface should be flush with the tile edge.
 6. Cleaning should begin after the surface develops a dry, skinned-over appearance, within 5 to 10 minutes, depending upon the temperature, humidity and absorption rate of the tile.
 7. Use two buckets of cleaning water: one for rinsing the majority of the grout residue from the grout sponge, and one for moistening the sponge in clean water.
 8. Move a moderately damp, rounded grout sponge across the tile surface in a circular motion to loosen grout and to shape the joints. Drag a clean and moderately damp sponge diagonally across the tile joints, applying slight pressure. Use one side of the sponge for each pass over the tile, rinsing the sponge after the second pass.
 9. Under certain conditions, a milky film can appear on the grout surface. This film will dissipate in 20 to 30 minutes after the washing step is completed.
 10. Change the water bucket frequently to prevent the development of a haze on the tile surface.

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11. If a residue is observed on the tile surface, a final wash can be performed about one hour after the initial wash. Add 30 mL (1 U.S. oz.) of a clear dishwashing soap to a pail containing 11.4 L (3 U.S. gallons) of clean water. Then use a clean, white, moistened scrub pad and a moistened sponge to remove the residue.
12. If the joints are not fully flush, MAPEI Flexcolor CQ and 3D can be re-applied after 24 hours of drying. If accent tile is used, verify tile thicknesses and retain first paragraph below if necessary. If difference in thickness is significant, consider providing a thicker substrate under thinner tile.

3.4 PROTECTION

- A. Protect installed tile work from damages by other trades and general abuse until substantial work completion and acceptance.
- B. Refer to manufacturer's product data sheet for recommendations regarding protection.

END OF SECTION 093123

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SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on exterior substrates.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Samples: For each type of paint system and each color and gloss of topcoat.

1.4 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

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- a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Concrete: 12 percent.
 2. Fiber-Cement Board: 12 percent.
 3. Masonry (Clay and CMUs): 12 percent.
 4. Wood: 15 percent.
 5. Portland Cement Plaster: 12 percent.
 6. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.

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1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

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

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

- A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 099113

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SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following interior substrates:
1. Concrete masonry units (CMU).
 2. Steel.
 3. Galvanized metal.
 4. Gypsum board.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each finish and for each color and texture required.
1. Submit samples on rigid backing, 8-inches (200 mm) square.
 2. Step coats on samples to show each coat required for system.
 3. Label each coat of each sample.
 4. Label each sample for location and application area.
- C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.3 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Source Limitations: Obtain block filler and primers for each coating system from the same manufacturer as the finish coats.
- C. MPI Standards:
1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.
- D. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
 2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
 3. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

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1.4 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Colors: As selected by Architect from manufacturer's full range.

2.2 BLOCK FILLERS

- A. Interior/Exterior Latex Block Filler: MPI #4.
 - 1. Epoxy Block Filler: MPI #116.

2.3 PRIMERS/SEALERS

- A. Interior Latex Primer/Sealer: MPI #50.

2.4 METAL PRIMERS

- A. Quick-Drying Alkyd Metal Primer: MPI #76.
- B. Waterborne Galvanized-Metal Primer: MPI #134.

2.5 LATEX PAINTS

- A. Interior Latex (Flat): MPI #53 (Gloss Level 1).
- B. Interior Latex (Satin): MPI #43 (Gloss Level 4).
- C. Interior Latex (Semigloss): MPI #54 (Gloss Level 5).

2.6 SOLVENT-BASED PAINTS

- A. Quick Dry (semigloss) MPI #81 (Gloss Level 5)

2.7 EPOXY PAINTS

- A. Epoxy cold cured gloss: MPI #77 (gloss level 5).

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2.8 FLOOR COATINGS

- A. Interior/Exterior Clear Concrete Floor Sealer (Water Based): MPI #99.
- B. Tile Clad High Solids with double cast grit (MPI#98)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
 - 3. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION AND APPLICATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Concrete Substrates: Remove release agents, curing compounds, efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
 - 1. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry and vacuum before painting.
- D. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

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1. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 2. Touch up bare areas and shop-applied prime coats that have been damaged. Wire brush, clean with solvents recommended by paint manufacturer, and tough up with same primer as the shop coat.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promise adhesion of subsequently applied paints.
- G. Aluminum Substrates: Remove surface oxidation.
- H. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.
- I. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- J. Apply paints according to manufacturer's written instructions.
1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of durable paint film.
 5. Provide finish coats that are compatible with primers used.
 6. The term "exposed surfaces" includes areas visible when permanent or built-in-fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
 7. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 8. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
 9. Sand lightly between each succeeding enamel or varnish coat.
- K. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- L. Painting Steel, Mechanical and Electrical Work: Paint items exposed, but not limited to the following:
1. Steel Work:
 - a. Exposed beams, columns, purlins, girts.
 - b. Exposed metal decking
 - c. Handrails, Guardrails, Risers, Stringers not scheduled to be galvanized.
 - d. Exposed miscellaneous fasteners, plates, angles
 - e. Other elements exposed to finished interior areas.
 2. Mechanical Work:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.

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- c. Pipe hangers and supports.
- d. Tanks that do not have factory-applied final finishes.
- e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
- f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
- g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
- h. Fire Sprinkler piping and components.
- 3. Electrical Work:
 - a. Switchgear.
 - b. Panelboards.
 - c. Electrical equipment that is indicated to have a factory-primed finish for field painting.
 - d. Exposed conduit and boxes
- M. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- N. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
- O. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.3 INTERIOR PAINTING SCHEDULE

- A. CMU Substrates:
 - 1. Latex System: MPI INT 4.2A.
 - a. Prime Coat: Interior/exterior latex block filler.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex (satin).
 - 2. Epoxy System: MPI INT 4.2G.
 - a. Prime Coat: Epoxy block filler.
 - b. Intermediate Coat: Epoxy cold cured gloss matching topcoat.
 - c. Topcoat: Epoxy cold cured (gloss).
- B. Steel Substrates:
 - 1. Alkyd Gloss Finish: MPI INT 5.1E.
 - a. Prime Coat: Quick-drying alkyd metal primer.
 - b. Intermediate Coat: Alkyd matching topcoat.
 - c. Topcoat: Alkyd (semigloss).
- C. Galvanized-Metal Substrates:
 - 1. Alkyd System: MPI INT 5.3L.
 - a. Prime Coat: Waterborne galvanized-metal primer.
 - b. Intermediate Coat: Alkyd matching topcoat.
 - c. Topcoat: Alkyd (semigloss).
- D. Gypsum Board Substrates:
 - 1. Latex System: MPI INT 9.2A.
 - a. Prime Coat: Interior latex primer/sealer.

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- b. Intermediate Coat: Interior latex matching topcoat.
- c. Topcoat: Interior latex (flat) at ceiling applications and (Satin) at wall applications.
- 2. Epoxy System: MPI INT 9.2F.
 - a. Prime Coat: Interior latex primer/sealer.
 - b. Intermediate Coat: Epoxy cold cured gloss matching topcoat.
 - c. Topcoat: Epoxy cold cured gloss.
- E. Interior Concrete Substrates:
 - 1. Epoxy System: MPI 98.
 - a. Tile-Clad High Solids epoxy polyamide coating.

END OF SECTION 099123

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SECTION 102113 – SOLID SURFACE TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Solid-surface toilet compartments configured as toilet enclosures and urinal screens including required fittings, hardware and accessories.
- B. Furnish and install supplementary blocking and accessories for a complete and secure installation.

1.2 REFERENCES

- A. Americans with Disabilities (ADA) Standards for Accessible Design.
- B. ANSI A117.1 - American National Standard for Buildings and Facilities - Providing Accessibility and Usability for Physically Handicapped People.
- C. ASTM E84 - Surface Burning Characteristics of Building Materials.
- D. UFAS - Uniform Federal Accessibility Standards.
- E. ASTM D792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
- F. ASTM E228 – Linear Thermal Expansion for Solid Materials
- G. ASTM D785 - Standard Test Method For Rockwell Hardness Of Plastics And Electrical Insulating Materials
- H. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- I. ASTM D638 – Standard Test Method for Tensile Properties of Plastics
- J. ASTM C365 - Standard Test Method for Flatwise Compressive Properties of Sandwich Cores

1.3 ACTION SUBMITTALS

- A. Product Data: Submit product data, specifications and manufacturer’s installation instructions.
- B. Shop Drawings: Submit shop drawings for Architect’s review and approval prior to fabrication, including pertinent details for installation, showing layout plan, sizes, attachments, supports and adaptation of system to specific project.

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- C. Samples: Submit a minimum of one 4" by 4" sample for each stone type selected.
- D. Test Data: Submit a summary of testing conducted verifying partition panel performance characteristics.

1.4 QUALITY ASSURANCE

- A. Source: Provide solid surface partitions which are the products of one manufacturer.

1.5 FIELD MEASUREMENTS

- A. Installer shall verify that field measurements are as indicated on shop drawings. Advise of any changes before fabrication and indicate measurements on Shop Drawings.
- B. Coordination: Coordinate location and quantity of any concealed in wall blocking.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in unopened factory labeled packages.
- B. Store products in manufacturer's unopened packaging until ready for installation, in a clean dry area protected from weather, moisture and damage; store units upright and not stacked unless permitted by manufacturer.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire Performance: Tested in accordance with, and pass the acceptance criteria of, NFPA 286.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Department of Justice "2010 ADA Standards for Accessible Design" ICC A117.1 and Florida Accessibility Code for toilet compartments designated as accessible.

2.2 ACCEPTABLE MANUFACTURER

- A. Acceptable Manufacturer: Porcelanosa-USA, 8700 N.W. 13th Terrace, Miami , FL 33172, Phone: 305.715.7153. Miguel Rodriguez, Sales Manager, 305-715-9635,

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mrodriguez@porcelanosa-usa.com, Said Maria, Product Manager, 786-427-7548,
smaria@porcelanosa-usa.com.

- B. Color: Luxury Series, Carrara Dark, L105-G9 – Satin Finish
- C. Substitutions: Not permitted.

2.3 SOLID SURFACE TOILET COMPARTMENTS

- A. Toilet-Enclosure Style: Overhead braced and floor anchored.
- B. Urinal-Screen Style: Wall hung.
- C. Door, Panel, and Pilaster Construction: Solid Surface panel material, not less than **1/2 inch** thick, seamless, with eased edges, no-sightline system, and with homogenous color and pattern throughout thickness of material.
 - 1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
- D. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; stainless steel.
- E. Brackets (Fittings):
 - 1. Stirrup Type: Ear or U-brackets, stainless steel.
 - 2. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

2.4 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories, Heavy Duty: Manufacturer's heavy-duty operating hardware and accessories.
 - 1. Hinges: Manufacturer's minimum **0.062-inch- (1.59-mm-)** thick stainless steel continuous, cam type that swings to a closed or partially open position, allowing emergency access by lifting door. Mount with through bolts.
 - 2. Latch and Keeper: Manufacturer's heavy-duty, surface-mounted, cast-stainless steel latch unit, designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through bolts.
 - 3. Coat Hook: Manufacturer's heavy-duty combination cast-stainless steel hook and rubber-tipped bumper, sized to prevent inswinging door from hitting compartment-mounted accessories. Mount with through bolts.
 - 4. Door Bumper: Manufacturer's heavy-duty, rubber-tipped, cast-stainless steel bumper at outswinging doors. Mount with through bolts.
 - 5. Door Pull: Manufacturer's heavy-duty, cast-stainless steel pull at outswinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through bolts.

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2.5 MATERIALS

- A. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- B. Stainless Steel Castings: ASTM A743/A743M.

2.6 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.
- D. Door Size and Swings: Unless otherwise indicated, provide **24-inch- (610-mm-)** wide, inswinging doors for standard toilet compartments and **36-inch- (914-mm-)** wide, outswinging doors with a minimum **32-inch- (813-mm-)** wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION OF SOLID SURFACE TOILET COMPARTMENTS

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: **1/2 inch (13 mm)**.
 - b. Panels and Walls: **1 inch (25 mm)**.
 - 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.
 - a. Locate wall brackets, so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.

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- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than **1-3/4 inches (44 mm)** into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels and adjust, so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Floor Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust, so doors are level and aligned with panels, when doors are in closed position.
- D. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on inswinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on outswinging doors to return doors to fully closed position.

END OF SECTION 102113

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SECTION 123661 - SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid surface material countertops.
2. Solid surface material backsplashes.
3. Solid surface material end splashes.
4. Solid surface material apron fronts.
5. Solid surface material sinks.

1.2 ACTION SUBMITTALS

- A. Product Data: For countertop materials and sinks.
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
- C. Samples: For each type of material exposed to view.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
 1. Restroom Countertops and Integral Sink Bowls
 - a. Acceptable Manufacturer: Porcelanosa-USA, 8700 N.W. 13th Terrace, Miami , FL 33172, Phone: 305.715.7153. Miguel Rodriguez, Sales Manager, 305-715-9635, mrodriguez@porcelanosa-usa.com, Said Maria, Product Manager, 786-427-7548, smaria@porcelanosa-usa.com.
 - b. Krion Product # 3105-G7, Color: Royal + Series, Elegant White -Glossy Finish
 - c. Substitutions: Not permitted.

2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
 1. Grade: Premium.

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- B. Configuration:
 - 1. Restroom Countertops Front: Straight, slightly eased at top with 6 inch apron
 - 2. Backsplash: Straight, slightly eased at corner.
 - 3. End Splash: Matching backsplash.
- C. Countertops: **1/2-inch- (12.7-mm-)** thick, solid surface material.
- D. Backsplashes: **1/2-inch- (12.7-mm-)** thick, solid surface material.
- E. Support Brackets: Primed Steel - 2-inch wide by 24-inch deep by 24-inch high, ¼-inch thick.
- F. Joints: Fabricate countertops without joints.
- G. Cutouts and Holes:
 - 1. Make cutouts in shop using template or pattern furnished by manufacturer. Form cutouts to smooth, even curves.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer.
- B. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- C. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions.
- D. Install wall backing as required for attachment of support brackets.
- E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
- F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive.
- G. Install aprons to backing and countertops with adhesive.

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- H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
- I. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661

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SECTION 211300 - BUILDING SPRINKLER SYSTEMS

1 GENERAL

- 1.1 Drawings and General provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Requirements and Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Extent of fire protection work is indicated on drawings and schedules, and by requirements of this section.
- 1.4 Refer to Division-2 sections for site fire protection piping and appurtenances; not work of this section.
- 1.5 Refer to Division-9 sections for painting of fire protection piping; not work of this section.
- 1.6 Refer to Division-26 sections for the following work; not work of this section.
- 1.6.1 Power supply wiring from power source to power connection on air compressors . Include disconnects and required electrical devices, except where specified as furnished or factory-installed by manufacturer.
- 1.6.2 Fire alarm connections for all flow switches, pressure switches, and supervisory (tamper) switches.
- 1.7 Codes and Standards:
- 1.7.1 NFPA Compliance: Install fire protection systems in accordance with NFPA 13 "Standard for the Installation of Sprinkler Systems"
- 1.7.2 UL Compliance: Provide fire protection products in accordance with UL standards; provide UL label on each product.
- 1.7.3 Fire Department/Marshal Compliance: Install fire protection systems in accordance with local regulations of fire department or fire marshal.
- 1.7.4 Screw Thread Connections: Comply with local Fire Department/Fire Marshal regulations for sizes, threading and arrangement of connections for fire department equipment to sprinkler systems.
- 1.8 Approval Submittals:
- 1.8.1 Product Data: Submit manufacturer's technical product data and installation instructions for:
- Pipe and fittings
Basic pipe supports and hangers

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Basic valves
Special valves
Pressure gauges
Automatic sprinklers
Cabinets

- 1.10.2 Working (Shop) Drawings: Prepare working (shop) drawings of fire protection systems indicating pipe sizes, pipe locations, pipe elevations, fittings, shutoffs, hangers, equipment, and coordination with other building systems. Submittal shall show all requirements per NFPA-13.
- 1.11 Test Reports and Verification Submittals:
- 1.11.1 Certificate: Submit certificate of Aboveground Installation upon completion of fire protection piping work which indicates that work has been tested in accordance with NFPA 13 and that system is operational, complete, and has no defects.
- 1.11.2 Tag: Submit a copy of the sprinkler system tag. The installing fire sprinkler contractor shall be licensed in accordance with State Fire Marshal (SFM) Rule 4A-46. At the conclusion of the project and prior to the final inspection by the SFM the Contractor shall tag the fire sprinkler system in accordance with 4A-46.041.
- 1.12 O&M Data Submittals:
- 1.12.1 Record Drawings: At project closeout, submit record drawings of installed fire protection piping and products.
- 1.12.2 Maintenance Data: Submit a copy of all approval submittals. Submit maintenance data and parts lists for basic valves, special valves, air compressors and exhausters. Include these data in O&M manual.
- 1.12.3 NFPA 25: Provide a copy of NFPA 25 in each O&M Manual.

2 PRODUCTS

- 2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in fire protection systems. Where more than one type of material or products are indicated, selection is Installer's option.
- 2.2 Basic Identification: Provide identification complying with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification", in accordance with the following listing:

Fire Protection Piping: Plastic pipe markers. Fire piping exposed in mechanical and electrical

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rooms shall be painted red.

Fire Protection Valves: Plastic or brass valve tags

Fire Protection Signs: Provide the following signs:

At each sprinkler valve, sign indicating what portion of system valve controls and hydraulic design data.

At each auxiliary drain, a sign indicating location.

- 2.3 Basic Pipes and Pipe Fittings: Provide pipes and pipe fittings complying with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing. Where multiple listings are made for a particular type system, the material is the Installer's option.
- 2.4 Wet Pipe: Seamless black steel pipe; Schedule 40 for less than 8"; Schedule 30 for 8" and larger. Fittings and joints shall be as follows.
- 1 Class 125, cast-iron threaded fittings with threaded joints.
 - 2 Mechanical grooved pipe coupling and fittings; cut-groove type with mechanical joints.
 - 3 Wrought steel butt welding fittings with welded joints.
- 2.4.1 Wet Pipe: Seamless black steel pipe; Schedule 10 for 5" and smaller; 0.134" wall thickness for 6"; and 0.188" wall thickness for 8" and 10".
- 1 Class 125, cast-iron threaded fittings with threaded joints, sizes 2½" and larger.
 - 2 Mechanical grooved pipe couplings and fittings; roll-groove or mechanical locking type with mechanical joints.
 - 3 Wrought steel butt welding fittings with welded joints.
- 2.5 Basic Piping Specialties: Provide piping specialties complying with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".
- 2.6 Basic Supports and Anchors: Provide supports and anchors complying with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors", in accordance with the following listing:
- Adjustable steel clevis hangers or adjustable steel band hangers for horizontal-piping hangers and supports.
- Two-bolt riser clamps for vertical piping supports.

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Steel turnbuckles and malleable iron sockets for hanger-rod attachments.

Concrete inserts, top-beam C-clamps, side beam or channel clamps or center beam clamps for building attachments.

2.7 Basic Valves: Provide interior valves complying with Division-23 Basic Mechanical Materials and Methods section "Valves", in accordance with the following listing:

2.7.1 Standard Service Code-Required OS&Y Valves: GA-6, GA-7.

2.7.2 Standard Service Sectional Valves: GA-6, GA-7. BF-6, BF-7.

2.7.3 Standard Service Indicating Valves: GA-6, GA-7, BA-6.

2.7.4 Standard Service Trim Valves: GA-6, BA-4.

2.7.5 Standard Service Check Valves: CK-4, CK-5.

2.8 Special Valves:

2.8.1 General: Provide valves, UL listed, in accordance with the following listing. Provide sizes and types which mate and match piping and equipment connections.

2.8.2 Alarm Check Valve: Provide cast-iron water flow alarm check valve, 175 psi working pressure, with retard chamber.

2.8.3 Hose Outlet Valves: Provide angle hose valves, 2-1/2" size where not otherwise indicated. Provide chrome plated with escutcheons where mounted in cabinet. Provide chain and cap.

2.8.4 Ball Drip Check Valve: Provide fire department connection iron swing check valve, 175 psi rated working pressure, of size and end type indicated, with ball drip.

2.8.5 Acceptable Manufacturers: Subject to compliance with requirements, provide valves of one of the following:

Grinnell Fire Protection Systems Co., Inc.

Grunau Sprinkler Mfr. Co., Inc.

Reliable

Viking Corporation

2.9 Basic Meters and Gauges: Provide meters and gauges complying with Division-23 Basic Mechanical Materials and Methods section "Meters and Gauges", in accordance with the following listing:

2.9.1 Pressure gauges, 0-250 psi range.

2.10 Fire Protection Specialties: Provide fire protection specialties, UL listed, in accordance with

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the following listing. Provide sizes and types which mate and match piping and equipment connections.

- 2.10.1 Water Flow Indicators: Provide vane type water flow switches, with adjustable retard.
- 2.10.2 Supervisory Switches: Provide products recommended by manufacturer for use in service indicated.
- 2.10.3 Acceptable Manufacturers: Subject to compliance with requirements, provide fire protection specialties of one of the following:
- Grinnell Fire Protection Systems Co., Inc.
Grunau Sprinkler Mfr. Co., Inc.
Guardian Fire Equipment, Inc.
Potter Roemer, Inc.
Reliable
Viking Corporation
- 2.11 Automatic Sprinklers: Provide automatic sprinklers and escutcheons of type indicated on drawings, and in accordance with the following listing. Provide quick response type automatic sprinklers. Provide fusible links for 165°F unless otherwise indicated.
- 2.11.1 Sprinkler Types
- Upright.
Pendant.
Concealed pendent.
Extended Coverage Pendent-20x20 Maximum Coverage Area (Classrooms Only)
- 2.11.2 Finish: chrome-plated for concealed heads in occupied areas. Chrome-plated for pendant heads in exposed occupied areas. Cast brass for unoccupied areas.
- 2.11.3 Sprinkler Cabinet and Wrench: Furnish steel, baked red enameled, sprinkler box with capacity to store 10 sprinklers and wrench sized to sprinklers.
- 2.11.4 Acceptable Manufacturers: Subject to compliance with requirements, provide automatic sprinklers of one of the following:
- Central Sprinkler Corp.
Grinnell Fire Protection Systems Co., Inc.
Star Sprinkler Mfg. Co. Inc.
Reliable
Viking Corp.
Tyco
- 3 EXECUTION

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- 3.1 General: Examine areas and conditions under which fire protection materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer. Any installation, modification, or alteration of the sprinkler system shall be performed only by a person under a certificate of competency issued by the State Fire Marshal.
- 3.2 Installation of Basic Identification: Install mechanical identification in accordance with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification." Install fire protection signs on piping in accordance with NFPA 13 requirements. Continuously paint exposed fire piping red in mechanical and electrical rooms.
- 3.3 Installation of Pipes and Pipe Fittings:
- 3.3.1 General: Install pipes and pipe fittings in accordance with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings."
- 3.3.2 Comply with requirements of NFPA 13 for installation of fire protection piping materials. Install piping products where indicated, in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that piping systems comply with requirements and serve intended purposes.
- 3.3.3 Coordinate with other work as necessary to interface components of fire protection piping properly with other work.
- 3.3.4 Install drain piping at low points of piping system. Provide dry drum drips where indicated.
- 3.3.5 Install sectional valves in inlet piping, at bottom of each riser, and in loops as indicated.
- 3.3.6 Install water flow indicators where indicated.
- 3.3.7 Mount supervisory switches on each sectional valve.
- 3.3.8 Install pressure gauges where required and at top of each standpipe.
- 3.3.9 Install manual shutoff at each audible alarm station.
- 3.3.10 Install valved hose connections of sizes indicated, or ¾" size if not otherwise indicated, on sprinkler at ends of branch lines and cross mains and at locations where indicated. The intent is to meet the requirements of NFPA 13 and to achieve a fully drainable system.
- 3.3.13 Install Inspector's test connection where indicated, or at most remote point from riser.
- 3.4 Installation of Piping Specialties: Install piping specialties in accordance with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties."
- 3.5 Installation of Supports and Anchors: Install supports and anchors, in accordance with Division-23 Basic Mechanical Materials and Methods section, "Supports and Anchors."

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- 3.6 Installation of Valves: Install valves in accordance with Division-23 Basic Materials and Methods section "Valves." Provide valves to isolate each riser and elsewhere as required by NFPA 13 .
- 3.7 Installation of Meters and Gauges: Install meters and gauges in accordance with Division-23 Basic Mechanical Materials and Methods section "Meters and Gauges."
- 3.8 Installation of Fire Protection Specialties: Install fire protection specialties as indicated, and in accordance with NFPA 13. Furnish wiring requirements to electrical Installer for electrical wiring of supervisory switches.
- 3.9 Field Quality Control:
- 3.9.1 Sprinkler Piping Flushing: Prior to connecting sprinkler risers for flushing, flush feed mains, lead-in connections and control portions of sprinkler piping. After fire sprinkler piping installation has been completed and before piping is placed in service, flush entire sprinkler system, as required to remove foreign substances, under pressure as specified in NFPA 13. Continue flushing until water is clear, and check to ensure that debris has not clogged sprinklers.
- 3.9.2 Hydrostatic Testing: After flushing system, test fire sprinkler piping hydrostatically, for period of 24 hours, at not less than 200 psi or at 50 psi in excess of maximum static pressure when maximum static pressure is in excess of 150 psi. Check system for leakage of joints. Measure hydrostatic pressure at low point of each system or zone being tested.
- 3.9.3 Repair or replace piping system as required to eliminate leakage in accordance with NFPA standards for "little or no leakage" and retest as specified to demonstrate compliance.
- 3.10 Cleaning and Inspecting: Clean and inspect fire protection systems in accordance with requirements of Division-23 Basic Mechanical Materials and Methods section "Testing, Cleaning, and Sterilization of Piping Systems".
- 3.11 Extra Stock:
- 3.11.1 Heads: For each style and temperature range required, furnish additional sprinkler heads, amounting to one unit for every 100 installed units, but not less than 5 units of each.
- 3.11.2 Wrenches: Furnish 2 spanner wrenches for each type and size of valve connection and fire hose coupling. Obtain receipt from Owner that extra stock has been received.
- 3.12 Owner Instruction: Provide technical services for one 4-hour period to instruct Owner's personnel in operation and maintenance of building sprinkler systems. Schedule training date with Owner. Provide at least 7-day notice to Engineer and Owner of training date.

END OF SECTION 211300

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SECTION 220100 - PLUMBING GENERAL

1 GENERAL

1.1 The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the plumbing work as herein called for and shown on the drawings.

1.2 Related Documents:

1.2.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2.2 This is a Basic Plumbing Requirements Section. Provisions of this section apply to work of all Division-22 sections. Provisions of Division-23 Basic Mechanical Requirements Sections apply to work of all Division-22 sections.

1.2.3 Review all other contract documents to be aware of conditions affecting work herein.

1.2.4 Definitions:

1.2.4.1 Provide: Furnish and install, complete and ready for intended use.

1.2.4.2 Furnish: Supply and deliver to project site, ready for subsequent requirements.

1.2.4.3 Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.

1.3 Permits and Fees: Contractor shall obtain all necessary permits, meters, and inspections required for his work and pay all fees and charges incidental thereto.

1.4 Verification of Owner's Data: Prior to commencing any work the Contractor shall satisfy himself as to the accuracy of all data as indicated in these plans and specifications and/or as provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the Architect/Engineer in order that proper adjustments can be anticipated and ordered. Commencement by the Contractor of any work shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said data.

1.5 Delivery and Storage of Materials: Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.

1.6 Extent of work is indicated by the drawings, schedules, and the requirements of the specifications. Singular references shall not be constructed as requiring only one device if multiple devices are shown on the drawings or are required for proper system operation.

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1.7 Field Measurements and Coordination:

- 1.7.1 The intent of the drawings and specifications is to obtain a complete and satisfactory installation. Separate divisional drawings and specifications shall not relieve the Contractor or subcontractors from full compliance of work of his trade indicated on any of the drawings or in any section of the specifications.
- 1.7.2 Verify all field dimensions and locations of equipment to insure close, neat fit with other trades' work. Make use of all contract documents and approved shop drawings to verify exact dimension and locations.
- 1.7.3 Coordinate work in this division with all other trades in proper sequence to ensure that the total work is completed within contract time schedule and with a minimum cutting and patching.
- 1.7.4 Locate all apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on plumbing drawings, be guided by architectural details and conditions existing at job and correlate this work with that of others.
- 1.7.5 Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings and passageways. Cut no structural members without written approval.
- 1.7.6 Carefully examine any existing conditions, piping, and premises. Compare drawings with existing conditions. Report any observed discrepancies. It shall be the Contractor's responsibility to properly coordinate the work and to identify problems in a timely manner. Written instructions will be issued to resolve discrepancies.
- 1.7.7 Because of the small scale of the drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimensions and take actual measurements on the job. Locate piping, ductwork, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and for coordination with all trades. Contractor shall not order materials or perform work without such verification. No extra compensation will be allowed because field measurements vary from the dimensions on the drawings. If field measurements show that equipment or piping cannot be fitted, the Architect/Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

1.8 Guarantee:

- 1.8.1 The Contractor shall guarantee labor, materials and equipment for a period of one (1) year from Final Completion, or from Owner's occupancy, whichever is earlier. Contractor shall make good any defects and shall include all necessary adjustments to and replacement of defective items without expense to the Owner.

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- 1.8.2 Owner reserves right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.
- 1.9 Approval Submittals:
- 1.9.1 When approved, the submittal control log and submittals shall be an addition to the specifications herewith, and shall be of equal force in that no deviation will be permitted except with the approval of the Architect/Engineer.
- 1.9.1.1 Shop drawings, product literature, and other approval submittals will only be reviewed if they are submitted in full accordance with the General and Supplementary Conditions and Division 1 Specification sections and the following.
- 1.9.1.1.1 Submittals shall be properly organized in accordance with the approved submittal control log.
- 1.9.1.1.2 Submittals shall not include items from more than one specification section in the same submittal package unless approved in the submittal control log.
- 1.9.1.1.3 Submittals shall be properly identified by a cover sheet showing the project name, Architect and Engineer names, submittal control number, specification section, a list of products or item names with model numbers in the order they appear in the package, and spaces for approval stamps. A sample cover sheet is included at the end of this section.
- 1.9.1.1.4 Submittals shall have been reviewed and approved by the General Contractor (or Prime Contractor). Evidence of this review and approval shall be an "Approved" stamp with a signature and date on the cover sheet.
- 1.9.1.1.5 Submittals that include a series of fixtures or devices (such as plumbing fixtures or valves) shall be organized by the fixture number or valve type and be marked accordingly. Each fixture must include all items associated with that fixture regardless of whether or not those items are used on other fixtures.
- 1.9.1.1.6 The electrical design shown on the drawings supports the plumbing equipment basis of design specifications at the time of design. If plumbing equipment is submitted with different electrical requirements, it is the responsibility of the plumbing contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the plumbing submittal with a written statement that this change will be provided at no additional cost. Plumbing submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.
- 1.9.2 If the shop drawings show variation from the requirements of contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variation in writing in his letter of transmittal and on the submittal cover sheet in order that, if acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the contract.

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- 1.9.3 Review of shop drawings, product literature, catalog data, or schedules shall not relieve the Contractor from responsibility for deviations from contract drawings or specifications, unless he has in writing called to the attention of the Architect/Engineer each such deviation in writing at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, product literature, catalog data, or schedules. Any feature or function specified but not mentioned in the submittal shall be assumed to be included per the specification.
- 1.9.4 Submit shop drawings as called for in other sections after award of the contract and before any material is ordered or fabricated. Shop drawings shall consist of plans, sections, elevations and details to scale (not smaller than 1/4" per foot), with dimensions clearly showing the installation. Direct copies of small scale project drawings issued to the Contractor are not acceptable. Drawings shall take into account equipment furnished under other sections and shall show space allotted for it. Include construction details and materials.
- 1.10 Test Reports and Verification Submittals: Submit test reports, certifications and verification letters as called for in other sections. Contractor shall coordinate the required testing and documentation of system performance such that sufficient time exists to prepare the reports, submit the reports, review the reports and take corrective action within the scheduled contract time.
- 1.11 O&M Data Submittals: Submit Operation and Maintenance data as called for in other sections. When a copy of approval submittals is included in the O&M Manual, only the final "Approved" or "Approved as Noted" copy shall be used. Contractor shall organize these data in the O&M Manuals tabbed by specification number. Prepare O&M Manuals as required by Division 1 and as described herein.. Submit manuals at the Substantial Completion inspection.

2 PRODUCTS

- 2.1 All materials shall be new or Owner-supplied reused as shown on the drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them at the building and shall be of reputable manufacturers. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following sections.
- 2.2 Equipment and Materials:
- 2.2.1 Shall be new and the most suitable grade for the purpose intended. Equipment furnished under this division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar units or equipment.
- 2.2.2 Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated or painted.

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- 2.2.3 The label of the approving agency, such as UL, IBR, ASME, ARI, AMCA, by which a standard has been established for the particular item shall be in full view.
- 2.2.4 The equipment shall be essentially the standard product of a manufacturer regularly engaged in the production of such equipment and shall be a product of the manufacturer's latest design.
- 2.2.5 A service organization with personnel and spare parts shall be available within two hours for each type of equipment furnished.
- 2.2.6 Install in accordance with manufacturer's recommendations. Place in service by a factory trained representative where required.
- 2.2.7 Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material and type of construction desired. Manufacturer's products shown on the drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products, or the particular products of named manufacturers, meet the detailed specifications and that size and arrangement of equipment are suitable for installation.
- 2.2.8 Model Numbers: Catalog numbers and model numbers indicated in the drawings and specifications are used as a guide in the selection of the equipment and are only listed for the contractor's convenience. The contractor shall determine the actual model numbers for ordering materials in accordance with the written description of each item and with the intent of the drawings and specifications.
- 2.3 Requests for Substitution:
- 2.3.1 Where a particular system, product or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product or material specified.
- 2.3.2 Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.
- 2.3.2.1 Required product cannot be supplied in time for compliance with Contract time requirements.
- 2.3.2.2 Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.
- 2.3.2.3 Substantial cost advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services and similar considerations.
- 2.3.3 All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:

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Principal of operation.
 Materials of construction or finishes.
 Thickness of gauge of materials.
 Weight of item.
 Deleted features or items.
 Added features or items.
 Changes in other work caused by the substitution.
 Performance curves.

If the approved substitution contains differences or omissions not specifically called to the attention of the Architect/Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products (or to have the substituted products replaced) at the Contractor's expense.

3 EXECUTION

3.1 Workmanship: All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Architect/Engineer.

3.2 Coordination:

3.2.1 The Contractor shall be responsible for full coordination of the plumbing systems with shop drawings of the building construction so the proper openings and sleeves or supports are provided for piping, ductwork, or other equipment passing through slabs or walls.

3.2.2 Any additional steel supports required for the installation of any plumbing equipment, piping, or ductwork shall be furnished and installed under the section of the specifications requiring the additional supports.

3.2.3 It shall be the Contractor's responsibility to see that all equipment such as valves, dampers, filters and such other apparatus or equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the drawings.

3.2.4 All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.

3.2.5 The contractor shall protect equipment, material, and fixtures at all times. He shall replace all equipment, material, and fixtures which are damaged as a result of inadequate protection.

3.2.6 Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.

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- 3.2.7 Start of work will be construed as acceptance of suitability of work of others.
- 3.3 Interruption of Service: Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the Architect/Engineer and this work shall be done at the time best suited to the Owner. This will typically be on weekends and/or holidays and/or after normal working hours. Services shall be restored the same day unless prior arrangements are made. All overtime or premium costs associated with this work shall be included in the base bid.
- 3.4 Phasing: Provide all required temporary valves, piping, ductwork, equipment and devices as required. Maintain temporary services to areas as required. Remove all temporary material and equipment on completion of work unless Engineer concurs that such material and equipment would be beneficial to the Owner on a permanent basis.
- 3.5 Cutting and Patching: Notify General Contractor to do all cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under this section. Utilize experienced trades for cutting and patching. Obtain permission from Architect/Engineer before cutting any structural items.
- 3.6 Equipment Setting: Bolt equipment directly to concrete pads or vibration isolators as required, using hot-dipped galvanized anchor bolts, nuts and washers. Level equipment.
- 3.7 Painting: Touch-up factory finishes on equipment located inside and outside shall be done under Division 22. Obtain matched color coatings from the manufacturer and apply as directed. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.
- 3.8 Clean-up: Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, contractor is to carefully clean up and leave premises and all portions of building free from debris and in a clean and safe condition.
- 3.9 Start-up and Operational Test: Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be done by a qualified representative of the manufacturer. Alignment, lubrication, safety, and operating control shall be included in start-up check.
- 3.10 Record Drawings:
- 3.10.1 During the progress of the work the Contractor shall record on their field set of drawings the exact location, as installed, of all piping, ductwork, equipment, and other systems which are not installed exactly as shown on the contract drawings.
- 3.10.2 Upon completion of the work, record drawings shall be prepared as described in the General Conditions, Supplementary Conditions, and Division 1 sections.
- 3.11 Acceptance:

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- 3.11.1 Punch List: Submit written confirmation that all punch lists have been checked and the required work completed.
- 3.11.2 Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with project, for one day to instruct permanent operating personnel in operation of equipment and control systems. This is in addition to any specific equipment operation and maintenance training.
- 3.11.3 Operation and Maintenance Manuals: Furnish four complete manuals bound in ring binders with Table of Contents, organized, and tabbed by specification section. Manuals shall contain:
- Detailed operating instructions and instructions for making minor adjustments.
 - Complete wiring and control diagrams.
 - Routine maintenance operations.
 - Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.
 - Copies of approved submittals.
 - Copies of all manufacturer's warranties.
 - Copies of test reports and verification submittals.
- 3.11.4 Record Drawings: Submit record drawings.

END OF SECTION 220100

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SECTION 220700 - INSULATION FOR PLUMBING EQUIPMENT AND PIPING

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-22 Basic Plumbing Materials and Methods Sections apply to work of this section.
- 1.3 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.
- 1.4 Approval Submittals:
 - 1.4.1 Product Data: Submit a producer's data sheets and installation instructions on each insulation system including insulation, coverings, adhesives, sealers, protective finishes, and other material recommended by the manufacturer for applications indicated. Submit for:

Fiberglass pipe insulation
- 1.5 O&M Data Submittals: Submit a copy of all approval submittals. Include in O&M Manual.

2 PRODUCTS

- 2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide insulation products by Armstrong, Johns Manville, Knauf, Owens Corning, Pittsburgh Corning, U.S. Rubber, or approved equal. All products shall be asbestos-free.
- 2.2 Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics, and adhesive) with a flame-spread rating of 25 or less, and a smoke-developed rating of 50 or less, as tested by ANSI/ASTM E84.
- 2.3 Pipe Insulation Materials:
 - 2.3.1 Fiberglass Pipe Insulation: ASTM C547, Class 1 unless otherwise indicated. (Preformed sleeving with white all-service jacket, suitable for temperatures up to 450°F)
 - 2.3.2 Flexible Unicellular Pipe Insulation: ASTM C534, Type I. (Tubular, suitable for use to 200°F.)
 - 2.3.3 Staples, Bands, Wires, and Cement: As recommended by the insulation manufacturer for applications indicated.
 - 2.3.4 Adhesives, Sealers, Protective Finishes: Products recommended by the insulation manufacturer for the application indicated.
 - 2.3.5 Jackets: ASTM C921, Type I (vapor barrier) for piping below ambient temperature, Type II (vapor permeable) for piping above ambient temperature. Type I may be used for all piping at Installer's option.

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3 EXECUTION

3.1 General:

- 3.1.1 Install thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.
- 3.1.2 Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.
- 3.1.3 Maintain integrity of vapor-barrier on insulation and protect it to prevent puncture and other damage. Label all insulation "ASBESTOS FREE".
- 3.1.4 Do not apply insulation to surfaces while they are hot or wet.
- 3.1.5 Do not install insulation until systems have been checked and found free of leaks. Surfaces shall be clean and dry before attempting to apply insulation. A professional insulator with adequate experience and ability shall install insulation.
- 3.1.6 Do not install insulation on pipe systems until acceptance tests have been completed except for flexible unicellular insulation. Do not install insulation until the building is "dried-in".

3.2 Fiberglass Pipe Insulation:

- 3.2.1 Insulate the following piping systems (indoor locations):
 - 3.2.1.1 Domestic hot water, 180° F: up to 2" pipe - 1½" thick, over 2" pipe 2" thick.
 - 3.2.1.2 Domestic hot and tempered water, 140° F: up to 3" pipe - 1½" thick, over 3" pipe - 2" thick.
- 3.2.2 Apply insulation to pipe with all side and end joints butted tightly. Seal longitudinal lap by pressurizing with plastic sealing tool. Apply 3 inch wide self sealing butt strips to joints between insulation sections. Insulate all fittings, flanges, valves and strainers with premolded insulation. Apply coat of insulating cement to fittings and wrap with glass cloth overlapping each wrap 1" and adjacent pipe 2". Finish with heavy coat of general purpose mastic. Premolded PVC covers may also be used, but no flexible inserts are allowed.
- 3.2.3 Provide hanger or pipe support shields of 16 gauge (minimum) galvanized steel over the insulation which extends halfway up the pipe insulation cover and at least 6" on each side of the hanger.
- 3.2.4 Omit insulation on exposed plumbing fixture runouts from faces of wall or floor to fixture; on unions, flanges, strainer blowoffs, flexible connections and expansion joints.

END OF SECTION 220700

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SECTION 221113 - POTABLE WATER SYSTEM

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-22 Basic Plumbing Requirements and Basic Plumbing Materials and Methods sections apply to work of this section.
- 1.3 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.
- 1.4 Extent of potable water systems work, is indicated on drawings and schedules, and by requirements of this section.
- 1.5 Insulation for potable water piping is specified in other Division-22 sections, and is included as work of this section. Insulation requirements include:
- 1.5.1 Domestic hot water piping
- 1.6 Excavation and backfill required in conjunction with water piping is specified in other Division-23 sections, and is included as work of this section.
- 1.7 Code Compliance: Comply with applicable portions of Florida Building Code-Plumbing pertaining to selection and installation of plumbing materials and products. Comply with local utility requirements.
- 1.8 Approval Submittals:
- 1.8.1 Product Data: Submit manufacturer's technical product data and installation instructions for:
- Valves
 - Strainers
 - Wall hydrants
 - Water hammer arresters
 - Meters and gauges
 - Relief valves
 - Trap primers
- 1.9 Test Reports and Verification Submittals:
- 1.9.1 Disinfection: Submit report by Health Department.
- 1.10 O&M Data Submittals: Submit a copy of all approval submittals. Submit maintenance data and parts lists for valves, trap primers. Include these data in O&M manual.

2 PRODUCTS

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- 2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with Florida Building Code-Plumbing where applicable. Provide sizes and types matching pipe materials used in potable water systems. Where more than one type of materials or products is indicated, selection is Installer's option.
- 2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following listed for each item.
- 2.3 Identification: Provide identification complying with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification". Provide manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct burial service; not less than 6" wide x 4 mils thick. Provide blue tape with black printing reading "CAUTION WATER LINE BURIED BELOW".
- 2.4 Pipes and Fittings: Provide pipes and pipe fittings complying with Division-22 Basic Plumbing Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:
- 2.4.1 Interior Water Piping:
- 2.4.1.1 Above Grade: Copper tube; Type L, hard-drawn temper; wrought-copper fittings, solder-joints.
- 2.4.1.2 Below Grade: Copper tube; Type L, soft-annealed temper; no joints below floor.
- 2.4.2 Exterior Water Piping:
- 2.4.2.1 Copper tube; Type L, hard-drawn temper; wrought-copper fittings, solder-joints.
- 2.4.3 Solder joints shall be made with 95-5 solder.
- 2.5 Piping Specialties: Provide piping specialties complying with Division-22 Basic Plumbing Materials and Methods section "Piping Specialties".
- 2.6 Supports and Anchors: Provide supports and anchors complying with Division-22 Basic Plumbing Materials and Methods section "Supports and Anchors".
- 2.7 Interior Valves: Provide valves complying with Division-22 Basic Plumbing Materials and Methods section "Valves", in accordance with the following listing:
- 2.7.1 Sectional and Shutoff Valves: GA1, GA2, GA3, BA1, BA2.
- 2.7.2 Drain Valves: GA1, GA2, BA1, BA2.
- 2.7.3 Throttling Valves: BA1, BA2.

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- 2.7.4 Check Valves: CK1, CK2, CK3.
- 2.8 Wall Hydrants: Provide complete bronze body hose bibbs inside stainless steel box with hinged access door with cylinder lock and "WATER" stamped on cover. Provide key operated control valve with all bronze interior parts, replaceable seat washer, screwdriver operated stop valve in supply, and 3/4" male threaded hose connection. Zurn Z1350 or equal by Acorn or Woodford.
- 2.9 Water Hammer Arresters: Provide bellows type water hammer arresters, stainless steel casing and bellows, pressure rated for 250 psi, tested and certified in accordance with PDI Standard WH-201. Precision Plumbing Products, Josam, Zurn, Amtrol, Wade, Jay R. Smith, or approved equal.
- 2.10 Meters and Gauges: Provide meters and gauges complying with Division-22 Basic Plumbing Materials and Methods section "Meters and Gauges", in accordance with the following listing:
- Thermometers
Pressure gauges
Calibrated balancing cocks
- 2.11 Combined Pressure-Temperature Relief Valves: Provide relief valves as indicated, of size and capacity as selected by Installer for proper relieving capacity, in accordance with ASME Boiler and Pressure Vessel Code. Provide bronze body, test lever and thermostat complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210°F, and pressure relief at 150 psi. Watts, Cash, Zurn, or approved equal.
- 2.12 Trap Primers: Provide electronic trap primer in NEMA 1, UL 50 12x12x4 16 gauge steel cabinet with hinged access door. Entire cabinet to be coated with ANSI 61 gray polyester powder paint. Electronic trap primer shall cycle open for 6 seconds every 24 hours and provide a minimum of 2 oz at 20 psi for every drain served. 120v/1 phase. Provide distribution block to serve up to 4 floor drains.
- 3 EXECUTION
- 3.1 General: Examine areas and conditions under which potable water systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
- 3.2 Install plumbing identification in accordance with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification". Install underground plastic pipe markers during backfill, 6"-8" below grade.
- 3.3 Install water distribution piping in accordance with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings".
- 3.3.1 Install piping with 1/32" per foot (1/4%) downward slope towards drain point.

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- 3.3.2 Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.
- 3.4 Install exterior water piping in compliance with local governing regulations. Water piping shall be installed with a minimum of 30 inches of cover unless otherwise indicated.
- 3.5 Install piping specialties in accordance with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".
- 3.6 Install supports and anchors in accordance with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors".
- 3.7 Install valves in accordance with Division-23 Basic Mechanical Materials and Methods section "Valves".
- 3.7.1 Sectional Valves: Install on each branch and riser, close to main, where branch or riser serves two or more plumbing fixtures or equipment connections, and elsewhere as indicated.
- 3.7.2 Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.
- 3.7.3 Drain Valves: Install on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere where indicated or required to completely drain potable water system.
- 3.7.4 Check Valves: Install where indicated.
- 3.8 Hose Bibbs and Wall Hydrants: Install on concealed piping where indicated with vacuum breaker. Mount 18 inches above grade or finished floor.
- 3.9 Install meters and gauges in accordance with Division-23 Basic Mechanical Materials and Methods section "Meters and Gauges".
- 3.10 Install relief valves on each water heater, and where indicated in accordance with the manufacturer's instructions. Pipe full size outside or to floor drain. Cut the end of the pipe at a 45° angle and terminate 6 inches above the floor or grade.
- 3.11 Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated, but in no case smaller than required by Florida Building Code-Plumbing.
- 3.12 Plumbing Equipment Connections: Connect hot and cold water piping system to plumbing equipment as indicated, and comply with equipment manufacturer's installation instructions. Provide shutoff valve and union for each connection, provide drain valve on drain connection.
- 3.13 Install water hammer arresters in upright position, in locations and of sizes indicated in accordance with PDI Standard WH-201.

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- 3.14 Install trap primers as indicated, and in accordance with manufacturer's installation instructions. Provide access panels to all trap primers unless accessible through a lay-in ceiling or inside mechanical room.
- 3.15 Locate all valves and devices requiring access above lay-in ceiling.
- 3.16 Piping Tests: Test, clean, and sterilize potable water piping in accordance with testing requirements of Division-23 Basic Mechanical Materials and Methods section "Testing, Cleaning, and Sterilization of Piping Systems".

END OF SECTION 221113

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SECTION 221316 - SOIL, WASTE AND VENT SYSTEM

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-22 Basic Plumbing Requirements and Basic Plumbing Materials and Methods sections apply to work of this section.
- 1.3 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.
- 1.4 Extent of soil waste and vent systems work is indicated on drawings and schedules, and by requirements of this section.
- 1.5 Refer to appropriate Division-2 sections for exterior sanitary sewer system required in conjunction with soil and waste systems; not work of this section.
- 1.6 Excavation and backfill required in conjunction with soil, waste and vent piping is specified in other Division-23 sections and is included as work of this section.
- 1.7 Refer to Division-7 section "Flashing and Sheet Metal" for flashings required in conjunction with soil and waste systems; not work of this section.
- 1.8 Code Compliance: Comply with applicable portions of Florida Building Code-Plumbing pertaining to plumbing materials, construction and installation of products. Comply with local utility requirements.
- 1.9 Approval Submittals:
- 1.9.1 Product Data: Submit manufacturer's technical product data for:
- Cleanouts
Floor drains

2 PRODUCTS

- 2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in soil and waste systems. Where more than one type of materials or products is indicated, selection is Installer's option.

Underground-Type Plastic Line Marker: Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide x 4 mils thick. Provide green tape with black printing reading "CAUTION SEWER LINE BURIED BELOW".

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- 2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following listed for each item.
- 2.3 Pipes and Fittings: Provide pipes and pipe fittings complying with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:
- 2.3.1 Above Ground Soil, Waste, and Vent Piping:
- 2.3.1.1 Polyvinyl chloride plastic pipe (PVC); Type DWV; PVC plastic type DWV socket-type fitting, solvent cement joints. Do not use in fire-rated assemblies or return air plenums.
- 2.3.2 Underground Building Drain Piping (within 5 feet of the building):
- 2.3.2.1 Pipe Size 6" and Smaller: Polyvinyl chloride sewer pipe (PVC); Type DWV; PVC plastic type DWV socket-type.
- 2.4 Pipe Specialties: Provide piping specialties complying with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".
- 2.5 Supports and Anchors: Provide supports and anchors complying with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors".
- 2.6 Cleanouts: Provide factory-fabricated drainage piping products of size and type indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and governing regulations. Josam, Jay R. Smith, Wade, Zurn.
- 2.6.1 Cleanout Plugs: Cast-bronze or brass, threads complying with ANSI B2.1 countersunk head.
- 2.6.2 Cleanout for PVC Systems:
- 2.6.2.1 Floor Cleanouts: Cast-iron body with adjustable head, brass plug, and scoriated nick-brass cover. Furnish with carpet flange for carpeted floors. Furnish with recessed cover for tile floors. Furnish with clamping ring for floors with membrane. Wade W-6030 hub outlet for push-on.
- 2.6.2.2 Cleanouts in Piping: PVC cleanout adaptor with threaded PVC plug.
- 2.6.2.3 Wall Cleanouts: PVC cleanout adaptor with tapped, countersunk, threaded brass plug. Square 9"x9" wall access cover, with scoriated nickel bronze finish.
- 2.6.2.4 Grade Cleanouts: PVC cleanout adaptor with countersunk, threaded brass plug. Wade W-8590-D plug. In sidewalks and other finished concrete, provide access cover frames with a non-tilting tractor cover. Wade W-7035-Z or equal.
- 2.6.2.5 Cleanouts in Paved Areas: Cast iron body, adjustable housing, ferrule with plug and round loose scoriated tractor cover. Wade W-8300-MF. Coordinate concrete depth at site with adjustable flange.

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- 2.7 Floor Drains: Provide floor drains of size as indicated on drawings; and type, including features, as specified herein. Josam, Jay R. Smith, Wade, Zurn.
- 2.7.1 Floor Drains: Provide 6"x6" floor drain with inside caulk bottom outlet or TY-Seal hub outlet with adaptor for cast iron trap installation and a 4" deep trap seal. Provide clamping rings for floors with membrane.
- 2.7.2 Strainer: Provide 5" satin-nickel bronze strainer.
- 2.7.3 Trap Primer Connection: Provide ½" trap primer tapping.
- 2.7.4 Funnel: Provide funnel where shown on the drawings.
- 2.7.5 Basis of Design: Zurn Z415S.
- 3 EXECUTION
- 3.1 Examine substrates and conditions under which soil and waste systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.
- 3.2 Piping Installation:
- 3.2.1 Install above grade soil and waste piping in accordance with Division-22 Basic Plumbing Materials and Methods section "Pipes and Pipe Fittings", and with Florida Building Code-Plumbing.
- 3.2.2 Install underground soil and waste pipes as indicated and in accordance with Florida Building Code-Plumbing. Lay underground piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.
- 3.2.3 Install building soil and vent piping pitched to drain at minimum slope of ¼" per foot (2%) for piping smaller than 3", and 1/8" per foot (1%) for piping 3" and larger.
- 3.3 Install piping specialties in accordance with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".
- 3.4 Install supports and anchors in accordance with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors".
- 3.5 Installation of Cleanouts: Install in above ground piping and building drain piping as indicated, as required by Florida Building Code-Plumbing; and at each change in direction of piping greater than 45°; at minimum intervals of 50' for piping 4" and smaller and 100' for larger piping; and at base of each vertical soil or waste stack. Install floor and wall cleanout covers for concealed

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pipng, select type to match adjacent building finish.

- 3.5.1 Size: Cleanouts shall be full size up to 4". Piping over 4" shall have a reducing fitting to accommodate a 4" cleanout unless indicated otherwise on drawings.
- 3.5.2 Install cleanouts to allow adequate clearance for rodding.
- 3.5.3 Protect all finished surfaces of cleanouts with a suitable adhesive covering until construction is completed.
- 3.5.4 Cleanouts to Grade: Provide an 18" x 18" x 8" thick concrete pad around the cleanout. Set the cleanout ferrule, adapter, or access cover frame in the concrete as required. The cleanout shall be extended to the finished grade. The concrete pad shall slope away from the cleanout in all directions approximately one inch. Cover pad with fill to finished grade.
- 3.5.5 Cleanouts in Paved Areas: Provide concrete pad similar to cleanout to grade and coordinate concrete depth at site with adjustable flange. Access cover frames are required.
- 3.6 Flashing Flanges: Install flashing flange and clamping device with each stack and cleanout passing through waterproof membranes.
- 3.7 Vent Flashing Sleeves: Install on stack passing through roof, secure to stack flashing in accordance with manufacturer's instructions. For metal roofs, sleeves and flashing are by Division-7.
- 3.8 Installation of Floor Drains: Install floor drains in accordance with manufacturer's written instructions and in locations indicated.
 - 3.8.1 Coordinate flashing work with work of waterproofing and adjoining substrate work.
 - 3.8.2 Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.
 - 3.8.3 Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.
 - 3.8.4 Position drains so that they are accessible and easy to maintain.
- 3.9 Connection of Trap Primers: Connect trap primers as indicated, and in accordance with manufacturer's installation instructions. Pitch piping towards drain trap, minimum of 1/8" per foot (1%). Adjust trap primer for proper flow.
- 3.10 Piping Runouts to Fixtures: Provide soil and waste piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated, but in no case smaller than required by Florida Building Code-Plumbing.
- 3.11 Test, clean, flush, and inspect soil and waste piping in accordance with requirements of Division-23 Basic Mechanical Materials and Methods section "Testing, Cleaning and Sterilization of

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Piping Systems". END OF SECTION 221316

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SECTION 223000 - PLUMBING FIXTURES, EQUIPMENT, TRIM & SCHEDULE

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-22 Basic Plumbing Requirements and Basic Plumbing Materials and Methods sections apply to work of this section.
- 1.3 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.
- 1.4 Extent of plumbing fixtures work required by this section is indicated on drawings and schedules, and by requirements of this section.
- 1.5 Refer to Division-26 sections for field-installed electrical wiring required for plumbing fixtures; not work of this section.
- 1.6 Codes and Standards:
 - 1.6.1 Plumbing Fixture Standards: Comply with applicable portions of Florida Building Code-Plumbing pertaining to materials and installation of plumbing fixtures.
 - 1.6.2 ANSI Standards: Comply with applicable ANSI standards pertaining to plumbing fixtures and systems.
 - 1.6.3 PDI Compliance: Comply with standards established by PDI pertaining to plumbing fixture supports.
 - 1.6.4 UL Listing: Construct plumbing fixtures requiring electrical power in accordance with UL standards and provide UL-listing and label.
 - 1.6.5 ARI Compliance: Construct and install water coolers in accordance with ARI Standard 1010 "Drinking-Fountains and Self-Contained Mechanically-Refrigerated Drinking-Water Coolers", and provide Certification Symbol.
 - 1.6.6 ANSI Compliance: Construct and install barrier-free plumbing fixtures in accordance with ANSI Standard A117.1 "Specifications for Making Buildings and Facilities Accessible To and Usable By Physically Handicapped People".
- 1.7 Approval Submittals:
 - 1.7.1 Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, furnished specialties and accessories; and installation instructions. Submit manufacturer's assembly-type drawings indicating dimensions, roughing-in requirements, required clearances, and methods of assembly of components and anchorages. The submittal shall be organized by "fixture number" and each fixture package shall be so identified. Each fixture package shall include all of the required fitting and trim, even if such

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devices are used for more than one fixture.

1.8 O&M Data Submittals: Submit a copy of approval submittals. Submit maintenance data and parts lists for each type of plumbing fixture and accessory; including "trouble-shooting" maintenance guide. Include these data in O&M manual.

1.9 Handle plumbing fixtures carefully to prevent breakage, chipping and scoring fixture finish. Do not install damaged plumbing fixtures; replace and return damaged units to equipment manufacturer.

2 PRODUCTS

2.1 General: Provide factory-fabricated fixtures of type, style and material indicated. For each type fixture, provide trim, carrier, seats, and valves as specified. Where not specified, provide products as recommended by manufacturer, and as required for complete installation. Where more than one type is indicated, selection is Installer's option; but, all fixtures of same type must be furnished by single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.

2.2 Model Numbers: Basis of design model numbers of a particular manufacturer are listed in the fixture schedule as an aid to contractors. Where conflicts between the model number and the written description occur, the written description shall govern. Where acceptable manufacturers are listed, products are subject to compliance with requirements.

2.3 Materials:

2.3.1 Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting seam marks, roller marks, foundry sand holes, stains, decoloration, or other surface imperfections on finished units are not acceptable.

2.3.2 All fixtures shall be white vitreous china unless otherwise specifically noted. Where enameled iron fixtures are specified, they shall be furnished with acid resisting enamel.

2.3.3 Where fittings, trim and accessories are exposed or semi-exposed provide bright chrome-plated or polished stainless steel units. Provide copper or brass where not exposed.

2.3.4 Stainless Steel Sheets: ASTM A 167, Type 302/304, hardest workable temper. Finish shall be No. 4, bright, directional polish on exposed surfaces.

2.3.5 Vitreous China: High quality, free from fire cracks, spots, blisters, pinholes and specks; glaze exposed surfaces, and test for crazing resistance in accordance with ASTM C 554.

2.3.6 Synthetic Stone: High quality, free from defects, glaze on exposed surfaces, stain resistant.

2.4 Plumbing Fittings, Trim and Accessories:

2.4.1 Faucets: At locations where water is supplied (by manual, automatic or remote control), provide commercial quality chrome-plated, cast-brass faucets, valves, or other dispensing

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devices, of type and size indicated, and as required to operate as indicated.

- 2.4.1.1 Aerators: Provide aerators of types approved by Health Department having jurisdiction.
- 2.4.1.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Chicago Faucet Co., Kohler Co., Speakman Co., T & S Brass and Bronze Works, Water Saver Faucet Co., Zurn.
- 2.4.2 Stops: Provide chrome-plated brass, angle type, manual shutoff valves and 3/8" chrome-plated flexible supply pipes to permit fixture servicing without shutdown of water supply piping systems for all fixtures. Coordinate with fixture requirements.
 - 2.4.2.1 Provide loose key stops.
 - 2.4.2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Zurn or approved equal.
- 2.4.3 Waste Outlets: Provide removable P-traps, drains, waste arms, tailpieces and wastes-to-wall where drains are indicated for direct connection to drainage system for all fixtures unless otherwise noted. Provide drains, tailpieces and waste arms where indirect drains are indicated. Waste outlets shall be full size of fixture drain connection.
 - 2.4.3.1 Provide chrome-plated cast-brass P-traps and drains with cleanout.
 - 2.4.3.2 P-traps, wastes and drains of all types shall be 17-gauge.
 - 2.4.3.3 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Zurn, or approved equal.
- 2.4.4 Flush Valves: Provide quiet-flush, chrome-plated, cast-brass flush valves with vacuum breaker and screwdriver stop. Where handicap service is indicated, provide ADA compliant handles with the handle on the wide side of the stall.
 - 2.4.4.1 Automatic Flush Valves: Provide self-adaptive, electronic, infrared-sensor operated flush valves with 24 volt solenoid operator and override button. Provide a box-mounted, hard-wired transformer (120 VAC primary - 24 VAC secondary) with each flush valve. Provide matching wall cover plates each with four vandal-resistant screws. All wiring and electrical connections shall be provided by Division - 26.
 - 2.4.4.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Sloan Valve Co. or Zurn.
- 2.4.5 Carriers: Provide cast-iron supports for fixtures of either graphitic gray iron, ductile iron, or malleable iron or steel as indicated. Coordinate with specific fixture requirements and conditions of the project.
 - 2.4.5.1 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Josam, Wade, Zurn, J.R. Smith.

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- 2.4.6 Fixture Bolt Caps: Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.
- 2.4.7 Escutcheons: Where fixture supplies and drains penetrate walls in exposed locations, provide chrome-plated brass escutcheons with friction clips.
- 2.4.8 Comply with additional fixture requirements listed for each fixture and as required for a complete and functional system.
- 2.5 Water Closets:
- 2.5.1 General: Provide white china siphon jet type unless otherwise noted.
- 2.5.1.1 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Crane, Kohler, or Zurn.
- 2.5.2 Fixture Seats: Provide white, heavy molded plastic fixture seats with stainless steel self-sustaining check hinges.
- 2.5.2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Bemis Mfg. Co., Beneke Corp., Church or Comfort Seats.
- 2.5.3 Water Closet Schedule:
- WC-1 WATER CLOSET, WALL-MOUNTED (HANDICAP, ELECTRONIC VALVE):
- Vitreous china, 1.1 gallons per flush, elongated, siphon jet, white, with 1-1/2" top spud, 17" high for handicapped. Provide quiet concealed diaphragm type electronic 6VDC motor actuator, sensor and over-ride button, check angle stop, non-hold-open feature, adjustable tailpiece, spud coupling and flanges, vacuum breaker, chrome plated wall cover plates with vandal resistant screws, all exposed parts chrome plated, hardwired with 7.6 VDC power converter. Control circuit shall be solid state 24V input and output initiating delay functions. Transformer, 120V primary, 24V secondary, UL listed serving up to ten closet valves, coordinate transformer with maximum number of valves furnished, low voltage wiring provided and installed by electrical contractor. Heavy molded plastic, white, elongated, open front seat less cover, with stainless steel self-sustaining check hinges. Hold centerline flush valve assembly off finish wall for grab bar clearances, coordinate with Architectural drawings. Horizontal Carrier :Furnish Horizontal floor mounted single/double, hub/no hub rigid system with universal foot supports, adjustable ABS coupling, rear anchor tie down and bonded Neo-Seal gasket, Vertical Carrier :Furnish vertical floor mounted single/double, hub/no hub rigid system with universal foot supports, adjustable ABS coupling, rear anchor tie down and bonded Neo-Seal gasket.), conforming to federal spec. FF-S-325.
- | | |
|---------------------|------------------------|
| Water closet | Zurn Z5615-BWL |
| Valve | Zurn ZEMS6000AV-ONE-IS |
| Seat | Z5955SS-EL-ST5 |
| Neo-seal gasket kit | Zurn Z5977-NEO |

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Power Converter	Zurn P-6000-HW6
Carrier 1	Zurn Z-1203H, HD, N, ND
Carrier 2	Zurn Z-1204H, HD, N, ND

WC-2 WATER CLOSET, WALL-MOUNTED (STANDARD, ELECTRONIC VALVE):

Vitreous china, 1.1 gallons per flush, elongated, siphon jet, white, with 1-1/2" top spud, 15" high for handicapped. Provide quiet concealed diaphragm type electronic 6VDC motor actuator, sensor and over-ride button, check angle stop, non-hold-open feature, adjustable tailpiece, spud coupling and flanges, vacuum breaker, chrome plated wall cover plates with vandal resistant screws, all exposed parts chrome plated, hardwired with 7.6 VDC power converter. Control circuit shall be solid state 24V input and output initiating delay functions. Transformer, 120V primary, 24V secondary, UL listed serving up to ten closet valves, coordinate transformer with maximum number of valves furnished, low voltage wiring provided and installed by electrical contractor. Heavy molded plastic, white, elongated, open front seat less cover, with stainless steel self-sustaining check hinges. Hold centerline flush valve assembly off finish wall for grab bar clearances, coordinate with Architectural drawings. (Carrier 1:Furnish Horizontal floor mounted single/double, hub/no hub rigid system with universal foot supports, adjustable ABS coupling, rear anchor tie down and bonded Neo-Seal gasket,) (Carrier 2:Furnish vertical floor mounted single/double, hub/no hub rigid system with universal foot supports, adjustable ABS coupling, rear anchor tie down and bonded Neo-Seal gasket,). conforming to federal spec. FF-S-325.

Water closet	Zurn Z5615-BWL
Valve	Zurn ZEMS6000AV-ONE-IS
Seat	Z5955SS-EL-ST5
Neo-seal gasket kit	Zurn Z5977-NEO
Power Converter	Zurn P-6000-HW6
Carrier 1	Zurn Z-1203H, HD, N, ND
Carrier 2	Zurn Z-1204H, HD, N, ND

2.6 Urinals:

2.6.1 General: Provide white china siphon jet wall hung type with ¾" top spud and 2" outlet unless otherwise noted. Provide short foot carrier with top and bottom hanger plates.

2.6.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Crane, Kohler, or Zurn.

2.6.3 Urinal Schedule:

UR-1 URINAL, WALL-MOUNT (STANDARD, ELECTRONIC VALVE):

Vitreous china, 0.125 gallons per flush, siphon jet flush, for 3/4" exposed top spud urinal, strainer, 2" I.P.S. outlet flange & rubber gasket with integral trap. Provide quiet concealed diaphragm type electronic 6 volt solenoid operator, sensor and over-ride button, check angle stop, non-hold-open feature, adjustable tailpiece, spud coupling and flanges, vacuum breaker,

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chrome plated wall cover plates with vandal resistant screws, all exposed parts chrome plated. Control circuit shall be solid state 6VCC input and output initiating delay functions. Transformer, 120V primary, 6V secondary, UL listed serving up to ten urinal valves, coordinate transformer with maximum number of valves furnished, low voltage wiring provided and installed by electrical contractor. Furnish floor mounted single carrier with hanger plate, bearing plate, adjustable supporting rods, structural uprights and block bases, secure base to floor for rigid connection with 1/2" x 3-3/4" threaded zinc plated steel heavy duty wedge anchors, complete with stainless steel clip, washer and threaded nut, conforming to federal spec. FF-S-325. Coordinate mounting height with Architectural drawings.

Urinal	Zurn Z5708
Valve	Zurn ZEMS6195AV-ULF-IS
Urinal Flange Kit	Zurn Z5976-URINAL
Power Converter	Zurn P6000-HW6
Carrier	Zurn Z-1222
Base Anchorage	B-Line Anchors AWA-50-375

UR-2 URINAL, WALL-MOUNT (HANDICAP, ELECTRONIC VALVE):

Vitreous china, 0.125 gallons per flush, siphon jet flush, for 3/4" exposed top spud urinal, strainer, 2" I.P.S. outlet flange & rubber gasket with integral trap. Provide quiet concealed diaphragm type electronic 24 volt solenoid operator, sensor and over-ride button, check angle stop, non-hold-open feature, adjustable tailpiece, spud coupling and flanges, vacuum breaker, chrome plated wall cover plates with vandal resistant screws, all exposed parts chrome plated. Control circuit shall be solid state 6V input and output initiating delay functions. Transformer, 120V primary, 6V secondary, UL listed serving up to ten urinal valves, coordinate transformer with maximum number of valves furnished, low voltage wiring provided and installed by electrical contractor. Furnish floor mounted single carrier with hanger plate, bearing plate, adjustable supporting rods, structural uprights and block bases, secure base to floor for rigid connection with 1/2" x 3-3/4" threaded zinc plated steel heavy duty wedge anchors, complete with stainless steel clip, washer and threaded nut, conforming to federal spec. FF-S-325. Mount to satisfy ADA requirements, coordinate with Architectural drawings (toilet room elevations) for final nounting height.

Urinal	Zurn Z5708
Valve	Zurn ZEMS6195AV-ULF-IS
Urinal Flange Kit	Zurn Z5976-URINAL
Power Converter	Zurn P6000-HW6
Carrier	Zurn Z-1222
Base Anchorage	B-Line Anchors AWA-50-375

2.7 Lavatories:

2.7.1 General: Provide white china lavatories.

2.7.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Crane, Kohler, or Zurn.

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2.7.3 Lavatory Schedule:

L-1 LAVATORY, WALL-MOUNT (HANDICAP):

Vitreous china 20" x 18", color "white", center hole setting & soap dispenser hole, rear overflow, for concealed arm support. Furnish floor-mounted single carrier with concealed arms, leveling and securing screws, structural uprights and block bases, secure base to floor for rigid connection with 1/2" x 3-3/4" threaded zinc plated steel heavy duty wedge anchors, complete with stainless steel clip, washer and threaded nut, conforming to federal spec. FF-S-325. Provide chrome plated angle stop to wall with chrome plated 1/2" IPS x 3/8" OD flexible supply and loose key operator, integral perforated cast brass strainer with elbow and 1-1/4" offset tailpiece, chrome plated 17 gauge cast brass P-trap with cleanout and tube waste to wall. Faucet (A): Polished chrome plated brass faucet, 0.5 gpm aerator, single lever handle. Lavatory P-trap and angle valve assemblies shall be insulated with fully molded insulation kit, and light gray color with 3-piece interlocking rap assembly and 2-piece interlocking angle valve assembly. Fasteners shall be nylon-type supplied with kit. Lavatory shall be mounted with a clearance of at least 28" from floor to bottom of the apron. Knee and toe clearances shall be as follows: 27" clear height shall be provided from finished floor to a point on underside of bowl 8" in from front apron. Toe clearance shall be a minimum height of 9" under P-trap and supplies or stops. See Architectural drawings for final mounting height. Under sink mixing valve with soldered connection, bronze body, limits hot water between 80°F & 120°F, double throttling, integral inlet filter washers & check valves, tamper resistant locking cap. Meets ASSE 1070 standards.

Lavatory	Zurn Z-5444
Faucet	Zurn Z-81000-XL
Supply w/stop	Zurn Z8802LRLK
P-Trap	Zurn Z8700-PC
Strainer/tailpiece	Zurn Z8746
Insulation kit	Zurn Z8946-3-NT
Carrier	Zurn Z-1231
Base Anchorage	B-Line Anchors AWA-50-375
Mixing Valve	Watts MMV-US-M1
Aerator	Zurn -3M

L-2 SOLID SURFACE COUNTERTOP WITH INTEGRAL BOWLS - TRIM ONLY

Verify quantity and locations architectural drawings prior to rough-in. Faucet shall be deck mounted, commercial grade, ADA compliant, electronic, sensor-activated, cast brass, brushed nickel hand washing faucet with automatic self-adapting sensor technology, low battery indicator, magnetic solenoid valve, 4 AA batteries, and 0.5 gpm aerator. soap dispenser shall be sensor activated, electronic, cast brass, brushed nickel hand washing foam soap dispenser with four AA size alkaline batteries. 1-1/4" offset tailpiece, chrome plated 17 gauge cast brass P-trap with cleanout and tube waste to wall. Mount per ADA requirements. Refer to architectural drawings for mounting heights. Under sink mixing valve with soldered connections, bronze body, limits hot water between 80 degrees F and 120 degrees F, double throttling, integral inlet filter washers & check valves, tamper resistant locking cap. Meets ASSE 1070 standards. Mixing valve outlet temperature shall be set to 105 degrees F. lavatory

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P-trap and angle valve assemblies shall be insulated with fully molded insulation kit, and light gray color with 3-piece interlocking rap assembly and 2-piece interlocking angle valve assembly. Fasteners shall be nylon type supplied with kit.

Lavatory	Furnished and installed by others
Faucet w/	Zurn Z6953-BN
Soap dispenser	Zurn Z6953-SD-BN
Supply w/stop	Zurn Z8800LRLK-PC
P-trap	Zurn Z8700-PC
Mixing valve	Watts MMV-US-M1
Insulation kit	Zurn Z8946-3-NT

L-3 SOLID SURFACE COUNTERTOP WITH INTEGRAL BOWLS - TRIM ONLY

Verify quantity and locations architectural drawings prior to rough-in. Faucet shall be deck mounted, commercial grade, ADA compliant, electronic, sensor-activated, cast brass, brushed nickel hand washing faucet with automatic self-adapting sensor technology, low battery indicator, magnetic solenoid valve, 4 AA batteries, and 0.5 gpm aerator. Soap dispenser shall be sensor activated, electronic, cast brass, brushed nickel hand washing foam soap dispenser with four AA size alkaline batteries. 1-1/4" offset tailpiece, chrome plated 17 gauge cast brass P-trap with cleanout and tube waste to wall. mount per ADA requirements. Refer to architectural drawings for mounting heights. Under sink mixing valve with soldered connections, bronze body, limits hot water between 80 degrees F and 120 degrees F, double throttling, integral inlet filter washers & check valves, tamper resistant locking cap. Meets ASSE 1070 standards. Mixing valve outlet temperature shall be set to 105 degrees F. Lavatory P-trap and angle valve assemblies shall be insulated with fully molded insulation kit, and light gray color with 3-piece interlocking rap assembly and 2-piece interlocking angle valve assembly. Fasteners shall be nylon type supplied with kit.

Lavatory	Furnished and installed by others
Faucet w/	Zurn Z6953-BN
Soap dispenser	Zurn Z6953-SD-BN
Supply w/stop	Zurn Z8800LRLK-PC
P-trap	Zurn Z8700-PC
Mixing valve	Watts MMV-S-M1
Insulation kit	Zurn Z8946-3-NT

2.8 Electric Water Coolers:

- 2.8.1 General: Provide self-contained electric water cooler with entire water system free of lead. All joints shall be made using silver solder. Units shall be complete with an air-cooled refrigeration system consisting of a hermetic compressor, cooler, pre-cooler, condenser fan, thermostat safety controls and all other related devices. The unit shall have a capacity of 8 gallons per hour. The cabinet shall be stainless steel with vermin proof insulation. The top shall be fabricated of stainless steel with a No. 4 finish. Where handicap units are indicated, the bubbler and fountain shall be ADA compliant.

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2.8.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Elkay Mfg. Co., Halsey Taylor Div., Haws Drinking Faucet Co., Sunroc, Oasis.

2.8.3 Electric Water Cooler Schedule:

EWC-1 ELECTRIC WATER COOLER - (BARRIER-FREE):

Dual level with bottle fill station, stainless steel wall mount, push button control, in-the-wall frame & plate, refrigeration system with R-134a refrigerant, tube-tank type cooling unit, fan cooled condenser, hermetically-sealed compressor, temperature control, and a chilling capacity of 8gph of 50°F water, NSF 42 & 53 certified filter, stainless steel grill, flex guard safety bubbler with protective stainless steel back plate. Bottle fill station is sensor-activation, filter status, green ticker, and drain. Furnish floor-mounted carrier with bearing plate, hanger plate, adjustable supporting rods, structural uprights and block bases. Mount to satisfy ADA requirements, verify final location, mounting height and finish with Architectural drawings. Provide freeze resistant valve assembly in recessed wall box complete with water supply valve and waste piping. Provide chrome plated angle stop to wall with chrome plated 1/2" IPS x 3/8" OD flexible supply and loose key operator, chrome plated 17 gauge cast brass P-trap with cleanout and tube waste to wall.

Electric Water Cooler	Elkay LZWS-LRPBM28K
Supply w/stop	Zurn Z8802LRLK
P-Trap	Zurn Z8700-PC

2.9 Thermostatic Mixing Valves:

2.9.1 General:

2.9.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item.

2.9.3 Thermostatic Mixing Valve Schedule:

MV-1 WATER MIXING VALVE (THERMOSTATIC MIXING):

Under sink mixing valve with threaded or soldered connection, bronze body, limits hot water between 80°F & 120°F, double throttling, integral inlet filter washers & check valves, tamper resistant locking cap. Meets ASSE 1070 standards.

Mixing Valve Threaded	Watts MMV-UT-M1
Mixing Valve Soldered	Watts MMV-US-M1

3 EXECUTION

3.1 Examine roughing-in work of potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates,

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and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

- 3.2 Install plumbing fixtures of types indicated where shown and at indicated heights. Install in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Install in accordance with ADA and applicable handicap code requirements. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of Florida Building Code-Plumbing pertaining to installation of plumbing fixtures. Furnish templates for cut-outs in countertops. Coordinate exact fixture locations with countertop shop drawings.
- 3.3 Fasten plumbing fixtures securely to indicated supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies behind or within wall construction so as to be rigid, and not subject to pull or push movement. Mount at heights shown on the drawings. Fixture heights are floor-to-rim distance. Fitting heights are to centerline.
- 3.4 Install stop valve in water supply to each fixture.
- 3.5 After fixtures are set, the crack between the fixture and wall shall be caulked with DAP silicone-based caulking, or approved product specified by the architect.
- 3.6 Protect installed fixtures from damage during remainder of construction period.
- 3.7 Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
- 3.8 Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect/Engineer. Remove cracked or dented units and replace with new units.
- 3.9 Clean plumbing fixtures, trim, aerators, and strainers of dirt and debris upon completion of installation.
- 3.10 Adjust water pressure at drinking fountains, faucets, shower valves, and flush valves to provide proper flow stream and specified gpm.
- 3.11 Adjust or replace washers to prevent leaks at faucets and stops.

END OF SECTION 223000

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SECTION 230100 - MECHANICAL GENERAL

1 GENERAL

1.1 The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the mechanical work as herein called for and shown on the drawings.

1.2 Related Documents:

1.2.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2.2 This is a Basic Mechanical Requirements Section. Provisions of this section apply to work of all Division 23 sections.

1.2.3 Review all other contract documents to be aware of conditions affecting work herein.

1.2.4 Definitions:

1.2.4.1 Provide: Furnish and install, complete and ready for intended use.

1.2.4.2 Furnish: Supply and deliver to project site, ready for subsequent requirements.

1.2.4.3 Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.

1.3 Permits and Fees: Contractor shall obtain all necessary permits, meters, and inspections required for his work and pay all fees and charges incidental thereto.

1.4 Verification of Owner's Data: Prior to commencing any work the Contractor shall satisfy himself as to the accuracy of all data as indicated in these plans and specifications and/or as provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the Architect/Engineer in order that proper adjustments can be anticipated and ordered. Commencement by the Contractor of any work shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said data.

1.5 Delivery and Storage of Materials: Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.

1.6 Extent of work is indicated by the drawings, schedules, and the requirements of the specifications. Singular references shall not be constructed as requiring only one device if multiple devices are shown on the drawings or are required for proper system operation.

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1.7 Field Measurements and Coordination:

- 1.7.1 The intent of the drawings and specifications is to obtain a complete and satisfactory installation. Separate divisional drawings and specifications shall not relieve the Contractor or subcontractors from full compliance of work of his trade indicated on any of the drawings or in any section of the specifications.
- 1.7.2 Verify all field dimensions and locations of equipment to insure close, neat fit with other trades' work. Make use of all contract documents and approved shop drawings to verify exact dimension and locations.
- 1.7.3 Coordinate work in this division with all other trades in proper sequence to insure that the total work is completed within contract time schedule and with a minimum cutting and patching.
- 1.7.4 Locate all apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on mechanical drawings, be guided by architectural details and conditions existing at job and correlate this work with that of others.
- 1.7.5 Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings and passageways. Cut no structural members without written approval.
- 1.7.6 Carefully examine any existing conditions, piping, and premises. Compare drawings with existing conditions. Report any observed discrepancies. It shall be the Contractor's responsibility to properly coordinate the work and to identify problems in a timely manner. Written instructions will be issued to resolve discrepancies.
- 1.7.7 Because of the small scale of the drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimensions and take actual measurements on the job. Locate piping, ductwork, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and for coordination with all trades. Contractor shall not order materials or perform work without such verification. No extra compensation will be allowed because field measurements vary from the dimensions on the drawings. If field measurements show that equipment or piping cannot be fitted, the Architect/Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

1.8 Guarantee:

- 1.8.1 The Contractor shall guarantee labor, materials and equipment for a period of *five ~~one~~ (4 5)* years from Final Completion, or from Owner's occupancy, whichever is earlier. Contractor shall make good any defects and shall include all necessary adjustments to and replacement of defective items without expense to the Owner.

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- 1.8.2 Owner reserves right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.
- 1.9 Approval Submittals:
- 1.9.1 When approved, the submittal control log and submittals shall be an addition to the specifications herewith, and shall be of equal force in that no deviation will be permitted except with the approval of the Architect/Engineer.
- 1.9.1.1 Shop drawings, product literature, and other approval submittals will only be reviewed if they are submitted in full accordance with the General and Supplementary Conditions and Division 1 Specification sections and the following.
- 1.9.1.1.1 Submittals shall be properly organized in accordance with the approved submittal control log.
- 1.9.1.1.2 Submittals shall not include items from more than one specification section in the same submittal package unless approved in the submittal control log.
- 1.9.1.1.3 Submittals shall be properly identified by a cover sheet showing the project name, Architect and Engineer names, submittal control number, specification section, a list of products or item names with model numbers in the order they appear in the package, and spaces for approval stamps. A sample cover sheet is included at the end of this section.
- 1.9.1.1.4 Submittals shall have been reviewed and approved by the General Contractor (or Prime Contractor). Evidence of this review and approval shall be an "Approved" stamp with a signature and date on the cover sheet.
- 1.9.1.1.5 Submittals that include a series of fixtures or devices (such as plumbing fixtures or valves) shall be organized by the fixture number or valve type and be marked accordingly. Each fixture must include all items associated with that fixture regardless of whether or not those items are used on other fixtures.
- 1.9.1.1.6 The electrical design shown on the drawings supports the mechanical equipment basis of design specifications at the time of design. If mechanical equipment is submitted with different electrical requirements, it is the responsibility of the mechanical contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the mechanical submittal with a written statement that this change will be provided at no additional cost. Mechanical submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.
- 1.9.2 If the shop drawings show variation from the requirements of contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variation in writing in his letter of transmittal and on the submittal cover sheet in order that, if acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the contract.

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- 1.9.3 Review of shop drawings, product literature, catalog data, or schedules shall not relieve the Contractor from responsibility for deviations from contract drawings or specifications, unless he has in writing called to the attention of the Architect/Engineer each such deviation in writing at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, product literature, catalog data, or schedules. Any feature or function specified but not mentioned in the submittal shall be assumed to be included per the specification.
- 1.9.4 Submit shop drawings as called for in other sections after award of the contract and before any material is ordered or fabricated. Shop drawings shall consist of plans, sections, elevations and details to scale (not smaller than 1/4" per foot), with dimensions clearly showing the installation. Direct copies of small scale project drawings issued to the Contractor are not acceptable. Drawings shall take into account equipment furnished under other sections and shall show space allotted for it. Include construction details and materials.
- 1.10 Test Reports and Verification Submittals: Submit test reports, certifications and verification letters as called for in other sections. Contractor shall coordinate the required testing and documentation of system performance such that sufficient time exists to prepare the reports, submit the reports, review the reports and take corrective action within the scheduled contract time.
- 1.11 O&M Data Submittals: Submit Operation and Maintenance data as called for in other sections. When a copy of approval submittals is included in the O&M Manual, only the final "Approved" or "Approved as Noted" copy shall be used. Contractor shall organize these data in the O&M Manuals tabbed by specification number. Prepare O&M Manuals as required by Division 1 and as described herein. Submit manuals at the Substantial Completion inspection.

2 PRODUCTS

- 2.1 All materials shall be new or Owner-supplied reused as shown on the drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them at the building and shall be of reputable manufacturers. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following sections.
- 2.2 Equipment and Materials:
- 2.2.1 Shall be new and the most suitable grade for the purpose intended. Equipment furnished under this division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar units or equipment.
- 2.2.2 Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated or painted.

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- 2.2.3 The label of the approving agency, such as UL, IBR, ASME, ARI, AMCA, by which a standard has been established for the particular item shall be in full view.
- 2.2.4 The equipment shall be essentially the standard product of a manufacturer regularly engaged in the production of such equipment and shall be a product of the manufacturer's latest design.
- 2.2.5 A service organization with personnel and spare parts shall be available within two hours for each type of equipment furnished.
- 2.2.6 Install in accordance with manufacturer's recommendations. Place in service by a factory trained representative where required.
- 2.2.7 Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material and type of construction desired. Manufacturer's products shown on the drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products, or the particular products of named manufacturers, meet the detailed specifications and that size and arrangement of equipment are suitable for installation.
- 2.2.8 Model Numbers: Catalog numbers and model numbers indicated in the drawings and specifications are used as a guide in the selection of the equipment and are only listed for the contractor's convenience. The contractor shall determine the actual model numbers for ordering materials in accordance with the written description of each item and with the intent of the drawings and specifications.
- 2.3 Requests for Substitution:
- 2.3.1 Where a particular system, product or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product or material specified.
- 2.3.2 Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.
- 2.3.2.1 Required product cannot be supplied in time for compliance with Contract time requirements.
- 2.3.2.2 Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.
- 2.3.2.3 Substantial cost advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services and similar considerations.
- 2.3.3 All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:

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Principal of operation.
Materials of construction or finishes.
Thickness of gauge of materials.
Weight of item.
Deleted features or items.
Added features or items.
Changes in other work caused by the substitution.
Performance curves.

If the approved substitution contains differences or omissions not specifically called to the attention of the Architect/Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products (or to have the substituted products replaced) at the Contractor's expense.

3 EXECUTION

3.1 Workmanship: All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Architect/Engineer.

3.2 Coordination:

3.2.1 The Contractor shall be responsible for full coordination of the mechanical systems with shop drawings of the building construction so the proper openings and sleeves or supports are provided for piping, ductwork, or other equipment passing through slabs or walls.

3.2.2 Any additional steel supports required for the installation of any mechanical equipment, piping, or ductwork shall be furnished and installed under the section of the specifications requiring the additional supports.

3.2.3 It shall be the Contractor's responsibility to see that all equipment such as valves, dampers, filters and such other apparatus or equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the drawings.

3.2.4 All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.

3.2.5 The contractor shall protect equipment, material, and fixtures at all times. He shall replace all equipment, material, and fixtures which are damaged as a result of inadequate protection.

3.2.6 Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.

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- 3.2.7 Start of work will be construed as acceptance of suitability of work of others.
- 3.3 Interruption of Service: Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the Architect/Engineer and this work shall be done at the time best suited to the Owner. This will typically be on weekends and/or holidays and/or after normal working hours. Services shall be restored the same day unless prior arrangements are made. All overtime or premium costs associated with this work shall be included in the base bid.
- 3.4 Phasing: Provide all required temporary valves, piping, ductwork, equipment and devices as required. Maintain temporary services to areas as required. Remove all temporary material and equipment on completion of work unless Engineer concurs that such material and equipment would be beneficial to the Owner on a permanent basis.
- 3.5 Cutting and Patching: Notify General Contractor to do all cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under this section. Utilize experienced trades for cutting and patching. Obtain permission from Architect/Engineer before cutting any structural items.
- 3.6 Equipment Setting: Bolt equipment directly to concrete pads or vibration isolators as required, using hot-dipped galvanized anchor bolts, nuts and washers. Level equipment.
- 3.7 Painting: Touch-up factory finishes on equipment located inside and outside shall be done under Division 23. Obtain matched color coatings from the manufacturer and apply as directed. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.
- 3.8 Clean-up: Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, contractor is to carefully clean up and leave premises and all portions of building free from debris and in a clean and safe condition.
- 3.9 Start-up and Operational Test: Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be done by a qualified representative of the manufacturer. Alignment, lubrication, safety, and operating control shall be included in start-up check.
- 3.10 Climate Control: Operate heating and cooling systems as required after initial startup to maintain temperature and humidity conditions to avoid freeze damage and warping or sagging of ceilings and carpet.
- 3.11 Record Drawings:
- 3.11.1 During the progress of the work the Contractor shall record on their field set of drawings the exact location, as installed, of all piping, ductwork, equipment, and other systems which are not installed exactly as shown on the contract drawings.

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- 3.11.2 Upon completion of the work, record drawings shall be prepared as described in the General Conditions, Supplementary Conditions, and Division 1 sections.
- 3.12 Acceptance:
- 3.12.1 Punch List: Submit written confirmation that all punch lists have been checked and the required work completed.
- 3.12.2 Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with project, for one day to instruct permanent operating personnel in operation of equipment and control systems. This is in addition to any specific equipment operation and maintenance training.
- 3.12.3 Operation and Maintenance Manuals: Furnish four complete manuals bound in ring binders with Table of Contents, organized, and tabbed by specification section. Manuals shall contain:
- Detailed operating instructions and instructions for making minor adjustments.
 - Complete wiring and control diagrams.
 - Routine maintenance operations.
 - Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.
 - Copies of approved submittals.
 - Copies of all manufacturer's warranties.
 - Copies of test reports and verification submittals.
- 3.12.4 Record Drawings: Submit record drawings.
- 3.12.5 Test and Balance Report: Submit four certified copies. The Report shall be submitted for review prior to the Substantial Completion Inspection unless otherwise required by Division 1.
- 3.12.6 Acceptance will be made on the basis of tests and inspections of job. A representative of firm that performed test and balance work shall be in attendance to assist. Contractor shall furnish necessary mechanics to operate system, make any necessary adjustments and assist with final inspection.
- 3.12.7 Control Diagrams: Frame under glass and mount on equipment room wall.

END OF SECTION 230100

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SECTION 230513 - ELECTRIC MOTORS

1 GENERAL

- 1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications Section apply to work of this Section.
- 1.2 This section is a Division 23 Basic Mechanical Materials and Methods section, and is part of each Division 23 section making reference to motors specified herein.
- 1.3 Extent of motors required by this section is indicated on drawings and/or specified in other Division-23 sections.
- 1.4 Comply with the requirements of Division 26.
- 1.5 UL Compliance: Comply with applicable UL standards pertaining to motors.
- 1.6 Approval Submittals:
- 1.6.1 Product Data: When required by other Division-23 sections, submit manufacturers standard product data sheets for each type of motor provided. Submit with Division-23 section using the motors, not as a separate submittal. Mark data sheet with arrows indicating product being supplied and list by unique descriptive name all motors to which each data sheet applies. Clearly indicate type, service factor, rpm, duty cycle, voltage, phase, nominal full load efficiency, power factor and insulation class. Field verify and coordinate mounting and frame requirements for matching the drive.
- 1.7 O&M Data Submittals: Submit a copy of approval submittals. Submit operation and maintenance data for each type of motor. Include these data in O&M Manual. Submit two copies of nameplate data sheet for each motor. One copy shall be included with the O&M Manual and a second copy shall be inserted in a waterproof pouch or bag and attached to the motor. Nameplate data sheets shall be typed or neatly printed and shall include all data on the motor nameplate plus a unique motor description such as "AHU-3 Fan Motor", "Distribution Pump #1" or similar description.

2 PRODUCTS

- 2.1 Acceptable Manufacturers: Subject to compliance with requirements, General Electric, Baldor, US Electric, or approved equal.
- 2.2 General:
- 2.2.1 Motors shall conform to applicable portions of NEMA Standard MG-1, Motors and Generators.
- 2.2.2 Motors shall be sized for the application such that when the driven equipment is operated at rated capacity the motor current will not exceed the full-load nameplate current. Service factor shall not be used in normal operation.

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2.3 Motor Design:

2.3.1 Integral Horsepower Motors:

2.3.1.1 Motors shall be open drip-proof or totally enclosed fan cooled as shown on the drawings or listed in the Division 23 section requiring motors.

2.3.1.2 Motors shall be three phase, 60 hertz, nominal 1800 rpm, rated at 200 volts for 208 volt systems, 230 volts for 240 volt systems and 460 volts for 480 volt systems.

2.3.1.3 Motors shall be NEMA Design B and shall have 1.15 service factor or greater at 60 hertz.

2.3.1.4 Insulation Systems

2.3.1.4.1 In fixed speed applications, motors shall have Class B insulation with 80°C rise over 40°C ambient.

2.3.1.4.2 For variable frequency drive (VFD) applications, motors shall have Class F insulation with 105°C rise over 40°C ambient. Motor manufacturer shall identify motors being used for VFD applications by marking the motor with a stainless steel name-plate “Inverter Ready”.

2.3.1.5 Motor efficiencies shall be based on IEEE-112, 1984, Test Method B, as specified in NEMA Standard MG1-12.53. NEMA motor efficiency and power factor shall be clearly shown on the motor nameplate. Inverter duty motors shall have a CIV rating based on NEMA.

2.3.1.6 Motors shall be premium efficiency type and shall meet or exceed the following minimum nominal efficiencies at rated voltage.

230/460 VOLT, 3 PHASE

HORSEPOWER RANGE	MINIMUM NOMINAL EFFICIENCY	MINIMUM ACCEPTABLE POWER FACTOR
1 to 2 hp	84.0 pct.	75.0 pct
3 to 5 hp	87.5 pct.	77.0 pct
7.5 hp	89.5 pct.	80.0 pct
10 hp	90.2 pct.	80.0 pct
15 hp	91.0 pct.	82.0 pct
20 to 25 hp	92.0 pct.	82.0 pct
30 hp	92.4 pct.	82.0 pct
40 to 50 hp	93.0 pct.	85.0 pct
60 hp	93.6 pct.	85.0 pct
75 hp	94.1 pct.	85.0 pct
100 to 125 hp	94.5 pct.	85.0 pct
150 to 200 hp	95.0 pct.	85.0 pct
over 200 hp	95.4 pct.	87.0 pct

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200 VOLT, 3 PHASE

HORSEPOWER RANGE	MINIMUM NOMINAL EFFICIENCY	MINIMUM ACCEPTABLE POWER FACTOR
1 to 2 hp	84.0 pct.	75.0 pct
3 to 5 hp	87.5 pct.	77.0 pct
7.5 hp	89.5 pct.	80.0 pct
10 hp	90.2 pct.	80.0 pct
15 hp	91.0 pct.	80.0 pct
20 to 25 hp	92.0 pct.	80.0 pct

- 2.3.1.7 Motors 25 hp and larger which are to be installed outdoors or in other high humidity areas shall be equipped with silicone rubber space heaters. Space heaters shall be energized when motor is de-energized.
- 2.3.2 Fractional Horsepower Motors one-half hp and above:
 - 2.3.2.1 Motors shall be open drip-proof or totally enclosed fan cooled as shown on the drawings or listed in the Division 23 section requiring motors.
 - 2.3.2.2 Motors shall be three phase, 60 hertz, nominal 1800 rpm, rated at 200, 230 or 460 volts as shown on the drawings.
 - 2.3.2.3 Motors shall be NEMA Design B with class B insulation, unless used with variable frequency drives.
- 2.3.3 Fractional Horsepower Motors less than one-half hp:
 - 2.3.3.1 Motors shall be single phase, 60 hertz, rated at 120 volts with integral thermal protection.
- 2.4 Overload Protection: Properly sized overload protection shall be provided for each motor. This protection may be an integral part of the motor or may be part of the motor controller and shall interrupt each ungrounded conductor.

3 EXECUTION

3.1 Motor Size and Location:

- 3.1.1 Size and location of motors shown on the drawings are based on a particular design and may change with a different manufacturer. Submittal of shop drawings or product literature indicating motor sizes or locations different from that designed indicates that Contractor has fully coordinated any required changes to the electrical system with other trades. Approval (if made) is on this basis and no additional cost will be allowed for any changes.
- 3.1.2 Contractor shall verify and make any necessary adjustments to electrical service, branch circuit wiring, branch circuit protection, overload protection, disconnect and controller (starter), or VFD based on actual nameplate data of the motors supplied prior to installation. Where applicable, connect motor winding thermostat to VFD.

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- 3.2 Motor Voltages: Contractor shall field verify system voltage prior to ordering or installing any motors. Submittal of shop drawings or product literature indicating motor voltages indicates that Contractor has fully coordinated the motor with the electrical system and that any discrepancies have been resolved. Approval (if made) is on this basis and no additional cost will be allowed for any changes.
- 3.3 Motor Mounting: Adjust motor mounting as required to adjust the drive train for proper belt operation and to accommodate sheave changes or other requirements of the test and balance work.

END OF SECTION 230513

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SECTION 230519 - METERS AND GAUGES**1 GENERAL**

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-21, 22, and 23 section making reference to or requiring meters and gauges specified herein.
- 1.3 Extent of meters and gauges required by this section is indicated on drawings and/or specified in other Division-21, 22 and 23 sections.
- 1.4 UL Compliance: Comply with applicable UL standards pertaining to meters and gauges.
- 1.5 ANSI and ISA Compliance: Comply with applicable portions of ANSI and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gauges.
- 1.6 Approval Submittals:
 - 1.6.1 Product Data: When required by other Division-23 sections, submit manufacturer's technical product data for each type of meter and gauge. Submit with Division-23 section using meters and gauges, not as a separate submittal. Include scale range, ratings, and calibrated performance curves, certified where indicated. Submit for:
 - Thermometers
 - Pressure gauges
 - Gauge connector plugs
 - Venturi flow meters
 - Automatic balancing valves
 - 1.7 O&M Data Submittals: Submit a copy of approval submittals. Submit calibration curves and operating instructions for each type of meter or gauge. Include this data in O&M Manual.

2 PRODUCTS

- 2.1 Acceptable Manufacturers (Thermometers and Pressure Gauges): Subject to compliance with requirements, Ashcroft, Ernst Gauge Company, Weksler, Marshalltown Instruments, Trerice, Weiss Instruments, Wheatley, Fluidyne or approved equal.
- 2.2 Glass Thermometers:
 - 2.2.1 General: Provide glass thermometers of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.
 - 2.2.2 Case: Die cast aluminum finished in baked epoxy enamel, glass front, spring secured, 9" long.

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- 2.2.3 Adjustable Joint: Die cast aluminum, finished to match case, 180° adjustment in vertical plane, 360° adjustment in horizontal plane, with locking device.
- 2.2.4 Tube and Capillary: Liquid filled, magnifying lens, 1% scale range accuracy, shock mounted.
- 2.2.5 Scale: Satin faced, non-reflective aluminum, permanently etched markings.
- 2.2.6 Stem: Copper-plated steel or brass for separable socket, length to suit installation.
- 2.2.7 Range: Conform to the following:
 - 2.2.7.1 Hot Water: 30° - 240°F with 2°F scale divisions.
 - 2.2.7.2 Chilled Water: 30° - 180°F with 2°F scale divisions.
- 2.3 Thermometer Wells: Provide thermometer wells constructed of brass or stainless steel, pressure rated to match piping system design pressure. Provide 2" extension for insulated piping. Provide cap nut with chain fastened permanently to thermometer well if wells do not have a permanent instrument installed. Same manufacturer as thermometers.
- 2.4 Pressure Gauges:
 - 2.4.1 General: Provide pressure gauges of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.
 - 2.4.2 Type: General use, 1% accuracy, ANSI B40.1 grade A, phosphor bronze bourdon type, bottom connection.
 - 2.4.3 Case: Drawn steel or brass, glass lens, 4-½" diameter.
 - 2.4.4 Connector: Brass with ¼" male NPT.
 - 2.4.5 Scale: White coated aluminum with black scale.
 - 2.4.6 Range: Select so that highest possible pressure does not exceed 75% of full scale.
- 2.5 Pressure Gauge Cocks:
 - 2.5.1 General: Provide ¼" ball valves for use as pressure gauge cocks.
 - 2.5.2 Snubber: ¼" brass bushing with corrosion resistance porous metal disc, through which pressure fluid is filtered. Select disc material for fluid served and pressure rating.
- 2.6 Gauge Connector Plugs:
 - 2.6.1 Provide temperature gauge connector plugs pressure rated for 500 psi and 200°F. Construct of brass and finish in nickel-plate, equip with 1/2" NPT fitting, with self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/2" O.D. probe assembly from dial type insertion

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thermometer. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness, for insulated piping. Pete's Plug or approved equal.

- 2.6.2 Provide pressure gauge connector plugs pressure rated for 500 psi and 200°F. Construct of brass and finish in nickel-plate, equip with 1/2" NPT fitting, with self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/2" O.D. probe assembly from dial type insertion pressure gauge. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness, for insulated piping. Pete's Plug or approved equal.
- 2.6.3 Provide master test kit with hard plastic case including one 2-1/2" test gauge of suitable range, one gauge adapter probe, and one stem pocket testing thermometer (0°F-220°F).

2.7 Shutoff and Manual Throttling Venturi Valves

- 2.7.1 Pipe 2" and Smaller: Provide as indicated, threaded brass manual throttling venturi valve with large diameter plated ball and PTFE seats. Provide blowout proof stem with EPDM O-ring and PTFE packing with packing nut. Provide 2" extended stem and measurement ports with caps.
- 2.7.2 Pipe Larger than 2": Provide as indicated, flanged steel manual throttling venturi valve with full lug type butterfly valve body with EPDM seat and gasket, stainless steel stem and disc, and nylon bearings. Provide 2" extended stem and measurement ports with caps.
- 2.7.3 Acceptable Manufacturers: Flow Design, Griswold, Bell & Gossett, NuTech.

2.8 Automatic Balancing Valves:

- 2.8.1 General: Provide as indicated, threaded automatic balancing valves equipped with optional valve kits to measure the flow rate. Valves shall utilize a stainless steel flow mechanism that is factory-set with $\pm 5\%$ accuracy. The flow mechanism shall be removable with standard tools to change the flow rate setting. Provide dual hose meter kit. Provide threaded mini's for terminal unit coils. Provide metal nameplate to indicate flow rate. Provide valves with pre-formed polyurethane insulation suitable for use on heating and cooling systems.
- 2.8.2 Acceptable Manufacturers: Griswold, Bell & Gossett, , Flow Design Inc., NuTech

3 EXECUTION

3.1 Installation of Temperature Gauges:

- 3.1.1 General: Install temperature gauges in vertical upright position, and tilt so as to be easily read by observer standing on floor.
- 3.1.2 Locations: Install in the following locations, and elsewhere as indicated:
- 3.1.2.1 At inlet and outlet of each hydronic coil in air handling units.
- 3.1.2.2 At inlet and outlet of each hydronic boiler and chiller.
- 3.1.3 Thermometer Wells: Install in piping tee where indicated, in vertical upright position.

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Thermometers shall have at least 75% of stem in moving fluid.

- 3.1.4 Temperature Gauge Connector Plugs: Install in piping tee where indicated, located on pipe at most readable position. Secure cap.
- 3.2 Installation of Pressure Gauges:
 - 3.2.1 General: Install pressure gauges in piping tee with pressure gauge cock, located on pipe at most readable position.
 - 3.2.2 Locations: Install in the following locations, and elsewhere as indicated:
 - 3.2.2.1 At suction and discharge of each pump.
 - 3.2.2.2 At discharge of each water pressure reducing valve.
 - 3.2.2.3 At inlet and outlet of water cooled condensers and refrigerant cooled chillers.
 - 3.2.3 Pressure Gauge Cocks: Install in piping tee with snubber.
 - 3.2.4 Pressure Gauge Connector Plugs: Install in piping tee where indicated, located on pipe at most readable position. Secure cap.
- 3.3 Automatic Balancing Valves: Install on piping in accordance with the manufacturer's printed instructions. Verify proper operation over full range of control valve and pump operation.
- 3.4 Adjusting and Cleaning:
 - 3.4.1 Adjusting: Adjust faces of meters and gauges to proper angle for best visibility.
 - 3.4.2 Cleaning: Clean windows of meters and gauges and factory-finished surfaces. Replace cracked or broken windows; repair any scratched or marred surfaces with manufacturer's touch-up paint.

END OF SECTION 230519

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SECTION 230520 - PIPES AND PIPE FITTINGS**1 GENERAL**

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-21, 22, and 23 section making reference to pipes and pipe fittings specified herein.
- 1.3 Extent of pipes and pipe fittings required by this section is indicated on drawings and/or specified in other Division-21, 22 and 23 sections.
- 1.4 Codes and Standards:
- 1.4.1 Welding: Qualify welding procedures, welders and operators in accordance with ASME B31.1, or ASME B31.9, as applicable, for shop and project site welding of piping work.
- 1.4.2 Brazing: Certify brazing procedures, brazers, and operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, for shop and job-site brazing of piping work.
- 1.5 Test Report and Verification Submittals:
- Submit welding certification for all welding installers.
 Submit brazing certification for all brazing installers.

2 PRODUCTS

- 2.1 Piping Materials: Provide pipe and tube of type, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with governing regulations and industry standards.
- 2.2 Pipe/Tube Fittings: Provide factory-fabricated fittings of type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable.
- 2.3 Piping Materials/Products:
- 2.3.1 Soldering Materials:
- 2.3.1.1 Tin-Antimony (95-5) Solder: ASTM B-32, Grade 95TA.
- 2.3.1.2 Silver-Phosphorus Solder: ASTM B-32, Grade 96TS.

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- 2.3.2 Pipe Thread Tape: Teflon tape.
- 2.3.3 Protective Coating: Koppers Bitumastic No. 505 or equal.
- 2.3.4 Gaskets for Flanged Joints: ANSI B16.21; full-faced for cast iron flanges; raised-face for steel flanges, unless otherwise noted.
- 2.3.5 Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials. Materials shall be determined by installer to comply with installation requirements.
- 2.3.6 Brazing Materials: Silver content of not less than 15%. Materials shall be determined by installer to comply with installation requirements.
- 2.4 Copper Tube and Fittings:
 - 2.4.1 Copper Tube:
 - 2.4.1.1 Copper Tube: ASTM B88; Type K or L as indicated for each service; hard-drawn temper unless specifically noted as annealed.
 - 2.4.1.2 ACR Copper Tube: ASTM B280.
 - 2.4.2 Fittings:
 - 2.4.2.1 Wrought-Copper Solder-Joint Fittings: ANSI B16.22.
 - 2.4.2.2 Copper Tube Unions: Provide standard products recommended by manufacturer for use in service indicated.
 - 2.4.2.3 Cast-Copper Flared Tube Fittings: ANSI B16.26.
- 2.5 Steel Pipes and Pipe Fittings
 - 2.5.1 Pipes:
 - 2.5.1.1 Black Steel Pipe: ASTM A-53 or A-120.
 - 2.5.1.2 Galvanized Steel Pipe: ASTM A-53 or A-120.
 - 2.5.1.3 Stainless Steel Pipe: Type 304, ASTM A269
 - 2.5.2 Pipe Fittings:
 - 2.5.2.1 Threaded Cast Iron: ANSI B16.4.
 - 2.5.2.2 Threaded Malleable Iron: ANSI B16.3; plain or galvanized as indicated.

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- 2.5.2.3 Malleable Iron Threaded Unions: ANSI B16.39; selected by installer for proper piping fabrication and service requirements including style, end connections, and metal-to-metal seats (iron, bronze or brass); plain or galvanized as indicated.
- 2.5.2.4 Threaded Pipe Plugs: ANSI B16.14.
- 2.5.2.5 Flanged Cast Iron: ANSI B16.1, including bolting.
- 2.5.2.6 Steel Flanges/Fittings: ANSI B16.5, including bolting and gasketing.
- 2.5.2.7 Wrought-Steel Buttwelding Fittings: ANSI B16.9, except ANSI B16.28 for short radius elbows and returns, rated to match connected pipe.
- 2.5.2.8 Pipe Nipples: Fabricated from same pipe as used for connected pipe; except do not use less than schedule 80 pipe where length remaining unthreaded is less than 1 ½ inches, and where pipe size is less than 1 ½ inches, and do not thread nipples full length (no close-nipples).
- 2.5.2.9 Stainless Steel Buttwelding Fittings: ASTM A403
- 2.6 Plastic Pipes and Fittings:
 - 2.6.1 Pipes:
 - 2.6.1.1 PVC DWV Pipe: ASTM D-2665, Schedule 40.
 - 2.6.2 Fittings:
 - 2.6.2.1 PVC Solvent Cement: ASTM D-2564.
 - 2.6.2.2 PVC DWV Socket: ASTM D-2665.
- 3 EXECUTION
 - 3.1 Installation
 - 3.1.1 General: Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently-leak proof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance or replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings, not bushings. Align piping accurately at connections, within 1/16" misalignment tolerance.
 - 3.1.2 Comply with ANSI B31 Code for Pressure Piping.
 - 3.1.3 Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not

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otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of building; limit clearance to ½" where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1" clearance outside insulation.

- 3.1.4 Concealed Piping: Unless specifically noted as "Exposed" on the drawings, conceal piping from view in finished and occupied spaces, by locating in column enclosures, chases, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.
- 3.1.5 Electrical Equipment Spaces: Do not run piping through transformer vaults and other electrical, communications, or data equipment spaces and enclosures unless shown. Install drip pan under piping that must run through electrical spaces.
- 3.1.5.1 Cut pipe from measurements taken at the site, not from drawings. Keep pipes free of contact with building construction and installed work.
- 3.2 Piping System Joints: Provide joints of the type indicated in each piping system.
- 3.2.1 Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply non-acid type solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.
- 3.2.2 Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed. Paint exposed threads to retard rusting.
- 3.2.3 Flanged Joints: Match flanges within piping system, and at connection with valves and equipment. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gaskets. Bolts shall project 1/8" to 3/8" beyond nut face when tight.
- 3.2.4 Weld pipe joints in accordance with recognized industry practice and as follows. Be guided by ANSI B.31.
- 3.2.4.1 Weld pipe joints only when ambient temperature is above 0°F.
- 3.2.4.2 Bevel pipe ends at a 37.5° angle where possible, smooth rough cuts, and clean to remove slag, metal particles and dirt.
- 3.2.4.3 Use pipe clamps or tack-weld joints; 4 welds for pipe sizes to 10". All welds shall be open-butt.

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- 3.2.4.4 Build up welds with root pass, followed by filler pass and then a cover pass. Eliminate valleys at center and edges of each weld. Weld by procedures which will ensure elimination of unsound or unfused metal, cracks, oxidation, blow-holes and non-metallic inclusions.
- 3.2.4.5 Do not weld-out piping system imperfections by tack-welding procedures; refabricate to comply with requirements.
- 3.2.4.6 At Installer's option, install forged branch-connection fittings wherever branch pipe is less than 3" and at least two pipe sizes smaller than main pipe indicated; or install regular "T" fitting, Weld-O-Let or equal.
- 3.2.5 Plastic Pipe Joints: Comply with manufacturer's instructions and recommendations, and with applicable industry standards.
- 3.2.5.1 Solvent-cemented joints shall be made in accordance with ASTM D-2235 and ASTM F-402.
- 3.2.5.2 PVC sewer pipe bell/gasket joints shall be installed in accordance with ASTM D-2321.
- 3.2.6 Braze copper tube-and-fitting joints where indicated, in accordance with ANSI B.31.
- 3.3 Piping Installation
- 3.3.1 Install piping to allow for expansion and contraction.
- 3.3.2 Isolate all copper tubing from steel and concrete by wrapping the pipe at the contact point, and for one inch on each side, with a continuous plastic sleeve. Isolate all copper tubing installed in block walls with a continuous plastic sleeve.
- 3.3.3 Underground Piping:
- 3.3.3.1 Provide plastic tape markers over all underground piping. Provide copper wire over all underground plastic piping outside the building. Locate markers 18" above piping.
- 3.3.3.2 Provide an 8 mil polyvinyl sleeve for the following types of pipe buried underground: black steel pipe, galvanized steel pipe, copper tubing.

END OF SECTION 230520

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SECTION 220523 - VALVES

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work of this section.
- 1.2 This section is a Division-23 Basic Materials and Methods section, and is part of each Division-21, 22 and 23 section making reference to or requiring valves specified herein.
- 1.3 Extent of valves required by this section is indicated on drawings and/or specified in other Division-21, 22 and 23 sections.
- 1.4 Quality Assurance:
- 1.4.1 Valve Dimensions: For face-to-face and end-to-end dimensions of flanged or welding-end valve bodies, comply with ANSI B16.10.
- 1.4.2 Valve Types: Provide valves of same type by same manufacturer.
- 1.4.3 Valve Listing: For valves on fire protection piping, provide UL listing.
- 1.4.4 Valves Installed in Boiler Rooms: Comply with ASME Boiler and Pressure Vessel Code.
- 1.5 Approval Submittals: Submit product data, catalog cuts, specifications, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valves with Division-23 section using the valves, not as a separate submittal. For each valve, identify systems where the valve is intended for use.

Gate Valves. Type GA.

Check Valves. Type CK.

Ball Valves. Type BA.

Butterfly Valves. Type BF.

- 1.6 O&M Data Submittals: Submit a copy of approval submittals. Submit installation instructions, maintenance data and spare parts lists for each type of valve. Include this data in the O&M Manual.

2 PRODUCTS

- 2.1 General: Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with specifications and installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube, and equipment connections.
- 2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide valves of one of

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the producers listed for each valve type. The model numbers are listed for contractor's convenience only. In the case of a model number discrepancy, the written description shall govern.

2.3 Gate Valves:

2.3.1 Packing: Select valves designed for repacking under pressure when fully opened, equipped with non-asbestos packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.

2.3.2 Comply with the following standards:

Cast Iron Valves: MSS SP-70. Cast Iron Gate Valves, Flanged and Threaded Ends.

Bronze Valves: MSS SP-80. Bronze Gate, Globe, Angle and Check Valves.

Steel Valves: ANSI B16.34. Steel Standard Class Valve Ratings.

2.3.3 Types of gate (GA) valves:

Threaded Ends 2" and Smaller (GA1): Class 125, bronze body, screwed bonnet, rising stem, solid wedge. Stockham B-100. Nibco T-111. Crane 428. Milwaukee 148.

Soldered Ends 2" and Smaller (GA2): Class 125, bronze body, screwed bonnet, non-rising stem, solid wedge. Stockham B-108 or B-109. Nibco S-111. Crane 1334. Milwaukee 149.

Flanged Ends 2½" and Larger (GA3): Class 125, iron body, bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge. Stockham G-623. Nibco F617-0. Crane 465½. Milwaukee F2885.

Threaded Ends 2" and Smaller (GA4): Class 150, bronze body, screwed bonnet, rising stem, solid wedge. Stockham B-122. Nibco T-131. Crane 431. Milwaukee 1150.

Soldered Ends 2" and Smaller (GA5): Class 150, bronze body, screwed bonnet, rising stem, solid wedge. Stockham B-124. Nibco S-134. Milwaukee 1169.

Threaded Ends 2" and Smaller (GA6): 175 WWP, bronze body, screwed bonnet, rising stem, OS&Y, solid wedge, UL-listed. Stockham B-133. Nibco T-104-0.

Flanged Ends 2½" and Larger (GA7): 175 WWP, iron body, bolted bonnet, rising stem, OS&Y, solid wedge, UL listed. Stockham G-634. Nibco F-607-0TS

Threaded Ends 2" and Smaller (GA8): Class 200, bronze body, union bonnet, rising stem, solid wedge, renewable seat. Stockham B-132. Nibco T-154-SS. Milwaukee 1174.

Flanged Ends 2½" and Larger (GA9): Class 250, iron body bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge. Stockham F-667. Nibco F-667-0. Crane 7½E.

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Milwaukee F-2894.

Threaded Ends 2" and Smaller (GA10): Class 300, bronze body, union bonnet, rising stem, solid wedge, renewable seat. Stockham B-145. Nibco T-174-SS. Crane 634E. Milwaukee 1184.

Flanged Ends 2½" and Larger (GA11): Class 300, cast steel body, bolted bonnet, rising stem, solid wedge, seal-welded seat rings. Provide trim to match use. Stockham 30-0F. Crane 33.

Flanged Ends 2½" and Larger (GA12): 300 WWP, iron body, bolted bonnet, bronze mounted, rising stem, OS&Y, solid wedge, UL-listed. Stockham F-670. Nibco F-697-0.

2.4 Check Valves:

2.4.1 Construction: Construct valves of castings free of any impregnating materials. Construct valves with a bronze regrinding disc with a seating angle of 40° to 45°, unless a composition disc is specified. Provide stop plug as renewable stop for disc hanger, unless otherwise specified. Disc and hanger shall be separate parts with disc free to rotate. Support hanger pins on both ends by removable side plugs.

2.4.2 Comply with the following standards:

Cast Iron Valves: MSS SP-71. Cast Iron Swing Check Valves, Flanged and Threaded Ends.

Bronze Valves: MSS SP-80. Bronze Gate, Globe, Angle and Check Valves.

Steel Valves: ANSI B16.34. Steel Standard Class Valve Ratings.

2.4.3 Types of check (CK) valves:

Threaded Ends 2" and Smaller (CK1): Class 125, bronze body, screwed cap, horizontal swing, bronze disc. Stockham B-319. Nibco T-413-BY. Crane 1707. Milwaukee 509.

Soldered Ends 2" and Smaller (CK2): Class 125, bronze body, screwed cap, horizontal swing, bronze disc. Stockham B-309. Nibco S-413-B. Crane 1707S. Milwaukee 1509.

Flanged Ends 2½" and Larger (CK3): Class 125, iron body, bronze-mounted, bolted cap, horizontal swing, cast-iron or composition disc. Stockham G-931 or G-932 as applicable. Nibco F918-B. Crane 373. Milwaukee F2974 as applicable.

Threaded Ends 2" and Smaller (CK4): 200 WWP, bronze body, screwed cap, horizontal swing, regrinding type bronze disc, for fire sprinkler use. Nibco KT-403-W.

Flanged Ends 2½" and Larger (CK5): 175 WWP, iron body, bolted cap, bronze mounted, composition disc, UL listed, with ball drip if required. Stockham G-940. Nibco F-908-W.

Threaded Ends 2" and Smaller (CK6): Class 200, bronze body, screwed cap, Y-pattern swing, regrinding bronze disc. Stockham B-345. Nibco T-453-B. Crane 36. Milwaukee 518/508.

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Flanged Ends 2½" and Larger (CK7): Class 250, iron body, bronze mounted, bolted cap, cast-iron disc. Stockham F-947. Nibco F-968-B. Crane 39E. Milwaukee F2970.

Threaded Ends 2" and Smaller (CK8): Class 300, bronze body, screwed cap, Y-pattern swing, regrinding bronze disc. Stockham B-375. Nibco T-473-B. Crane 76E. Milwaukee 517/507.

Flanged Ends 2½" and Larger (CK9): Class 300, cast steel body, bolted cap, horizontal swing, seal welded seat rings, chromium stainless disc. Stockham 30-SF. Crane 159.

2.5 Ball Valves:

2.5.1 General: Select with port area equal to or greater than connecting pipe area, include seat ring designed to hold sealing material.

2.5.2 Construction: Ball valves shall be rated for 150 psi saturated steam and 600 psi non-shock cold water. Pressure containing parts shall be constructed of ASTM B-584 alloy 844, or ASTM B-124 alloy 377. Valves shall be furnished with blow-out proof bottom loaded stem constructed of ASTM B-371 alloy 694 or other approved low zinc material. Provide TFE packing, TFE thrust washer, chrome-plated ball and reinforced teflon seats. Valves 1" and smaller shall be full port design. Valves 1¼" and larger shall be conventional port design. Stem extensions shall be furnished for use in insulated piping where insulation exceeds ½" thickness.

2.5.3 Comply with the following standards:

MSS SP-72. Ball Valves with Flanged or Butt Welding Ends for General Service.

MSS SP-110. Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

2.5.4 Types of ball (BA) valves:

Threaded Ends 2" and Smaller (BA1): Bronze two-piece full port body with adjustable stem packing, stainless steel ball, trim, and handle. Nibco T-585-66. Stockham T285-BR-R-T. Milwaukee BA100S. Apollo 77-100.

Soldered Ends 2" and Smaller (BA2): Bronze three-piece full port body with adjustable stem packing. Nibco S-595-Y-66. Milwaukee BA350. Apollo 82-200.

Threaded Ends 1" and Smaller (BA3): Bronze two-piece full port body, UL listed (UL 842) for use with flammable liquids and LP gas. Nibco T-585-70-UL.

Threaded Ends 2" and Smaller (BA4): 175 WWP, bronze two-piece body, UL listed for fire protection service. Nibco KT-585-70-UL and KT-580-70-UL.

Threaded Ends 2" and Smaller (BA5): 400 WWP, bronze two-piece body, for fire protection service. Nibco KT-580.

Threaded Ends 2½" and Smaller (BA6): 300 WWP, bronze three-piece body, gear

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operator with handwheel, indicator flag, accepts tamper switch, for fire protection, UL listed. Nibco T-505-4 and G-505-4.

Flanged Ends 2½" and Larger (BA7): Class 150, carbon steel full bore two-piece body with adjustable stem packing, stainless steel ball, trim, and handle. Nibco F515-S6 series. Apollo 88A-240.

2.6 Butterfly Valves:

2.6.1 General: Comply with MSS SP-67, Butterfly Valves. Provide butterfly valves designed for tight shut-off. Where used for terminal or equipment removal or repair, select lug type valves. Select wafer type valves for other applications. Provide gear operators on all butterfly valves 6" and larger.

2.6.2 Types of butterfly (BF) valves:

Wafer Type 3" and Larger (BF1): 200 CWP, cast-iron body, lever-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-512. Nibco WD 2110-3. Crane 42-FXB-TL. Milwaukee MW222E-8416.

Lug Type 3" and Larger (BF2): 200 CWP, cast-iron body, lever-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-712. Nibco LD 2110-3. Crane 44-FXB-TL. Milwaukee ML132B-8416.

Wafer Type 3" and Larger (BF3): 150/200 CWP, cast-iron body, gear-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-522 and LG-521. Nibco WD 2110-5. Crane 42-FXB-G. Milwaukee MW 122B-8115.

Lug Type 3" and Larger (BF4): 150/200 CWP, cast-iron body, gear-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-722 and LG-721. Nibco LD 2110-5. Crane 44-FXB-G. Milwaukee ML 132B-8115.

Wafer Type 4" and Larger (BF5): 175 WWP, cast-iron body, gear-operated, nickel-plated ductile iron disc, Type 410 stainless steel stem, EPT seat, UL listed. Stockham LG-52U. Nibco WD 3510-8.

Lug Type 4" and Larger (BF6): 175 WWP, cast-iron body, gear-operated, nickel-plated ductile iron or aluminum bronze disc, Type 410 stainless steel stem, EPT seat, UL listed. Stockham LG-72U. Nibco LD 3510-8.

Grooved Type 4" and Larger (BF7): 175 WWP, cast-iron body, gear-operated, nickel-plated ductile iron or aluminum bronze disc, Type 410 stainless steel stem, EPT seat, UL listed. Stockham LG-82U. Nibco GD 1765-2.

2.7 Valve Features:

2.7.1 General: Provide valves with features indicated and, where not otherwise indicated, provide

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proper valve features as determined by Installer for installation requirements. Comply with ANSI B31.1

2.7.2 Valve features specified or required shall comply with the following:

Bypass: Comply with MSS SP-45, and except as otherwise indicated, provide manufacturer's standard bypass piping and valving. Provide for gate valves 8" and larger.

Drain: Comply with MSS SP-45, and provide threaded pipe plugs complying with applicable Division-22 pipe or tube section. Provide for gate valves 8" and larger.

Flanged: Provide valve flanges complying with ANSI B16.1 (cast iron), ANSI B16.5 (steel), or ANSI B16.24 (bronze).

Threaded: Provide valve ends complying with ANSI B2.1.

Solder-Joint: Provide valve ends complying with ANSI B16.18.

Trim: Fabricate pressure-containing components of valve, including stems (shafts) and seats from brass or bronze materials, of standard alloy recognized in valve manufacturing industry unless otherwise specified.

Non-Metallic Disc: Provide non-metallic material selected for service indicated in accordance with manufacturer's published literature.

Renewable Seat: Design seat of valve with removable disc, and assemble valve so disc can be replaced when worn.

Extended Stem: Increase stem length by 2" minimum, to accommodate insulation applied over valve.

Mechanical Actuator: Provide factory-fabricated gears, gear enclosure, external chain attachment and chain designed to provide mechanical advantage in operating valve for all valves 4" and larger that are mounted more than 7'-0" above the floor, or are otherwise difficult to operate regardless of height.

3 EXECUTION

3.1 Installation:

3.1.1 General: Install valves where required for proper operation of piping and equipment, including valves in branch lines to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward below horizontal plane.

3.1.2 Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.

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- 3.1.3 Applications Subject to Corrosion: Do not install bronze valves and valve components in direct contact with steel, unless bronze and steel are separated by dielectric insulator.
- 3.1.4 Mechanical Actuators: Install mechanical actuators as recommended by valve manufacturer.
- 3.2 Selection of Valve Ends (Pipe Connections): Except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections:
- 3.2.1 Tube Size 2" and Smaller: Threaded valves.
- 3.2.2 Pipe Size 2" and Smaller: Threaded valves.
- 3.2.3 Pipe Size 2½" and Larger: Flanged valves.
- 3.3 Non-Metallic Disc: Limit selection and installation of valves with non-metallic disc to locations indicated and where foreign material in piping system can be expected to prevent tight shutoff of metal seated valves.
- 3.4 Renewable Seats: Select and install valves with renewable seats, except where otherwise indicated.
- 3.5 Installation of Check Valves: Install in horizontal position with hinge pin horizontally perpendicular to center line of pipe. Install for proper direction flow.

END OF SECTION 230523

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SECTION 230529 - SUPPORTS, ANCHORS, AND SEALS

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-23 Basic Materials and Methods section, and is a part of each Division-23 section making reference to or requiring supports, anchors, and seals specified herein.
- 1.3 Extent of supports, anchors, and seals required by this section is indicated on drawings and/or specified in other Division-23 sections.
- 1.4 Code Compliance: Comply with applicable codes pertaining to product materials and installation of supports, anchors, and seals.
- 1.5 MSS Standard Compliance:
- 1.5.1 Provide pipe hangers and supports of which materials, design, and manufacture comply with ANSI/MSS SP-58.
- 1.5.2 Select and apply pipe hangers and supports, complying with MSS SP-69.
- 1.5.3 Fabricate and install pipe hangers and supports, complying with MSS SP-89.
- 1.5.4 Terminology used in this section is defined in MSS SP-90.
- 1.6 UL Compliance: Provide products which are Underwriters Laboratories listed .

2 PRODUCTS

- 2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide supports and hangers by Grinnel, Michigan Hanger Company, B-Line Systems, or approved equal.
- 2.2 Horizontal-Piping Hangers and Supports: Except as otherwise indicated, provide factory-fabricated horizontal-piping hangers and supports complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.
- 2.2.1 Adjustable Steel Clevises: MSS Type 1.
- 2.2.2 Steel Double Bolt Pipe Clamps: MSS Type 3.

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- 2.2.3 Adjustable Steel Band Hangers: MSS Type 7.
- 2.2.4 Steel Pipe Clamps: MSS Type 4.
- 2.2.5 Pipe Stanchion Saddles: MSS Type 37, including steel pipe base support and cast-iron floor flange.
- 2.2.6 Single Pipe Rolls: MSS Type 41.
- 2.2.7 Adjustable Roller Hanger: MSS Type 43.
- 2.2.8 Pipe Roll Stands: MSS Type 44 or Type 47.
- 2.3 Vertical-Piping Clamps: Except as otherwise indicated, provide factory-fabricated vertical-piping clamps complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.
 - 2.3.1 Two-Bolt Riser Clamps: MSS Type 8.
 - 2.3.2 Four-Bolt Riser Clamps: MSS Type 42.
- 2.4 Hanger-Rod Attachments: Except as otherwise indicated, provide factory-fabricated hanger-rod attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod attachments to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.
 - 2.4.1 Steel Turnbuckles: MSS Type 13.
 - 2.4.2 Malleable Iron Sockets: MSS Type 16.
- 2.5 Building Attachments: Except as otherwise indicated, provide factory-fabricated building attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.
 - 2.5.1 Center Beam Clamps: MSS Type 21.
 - 2.5.2 C-Clamps: MSS Type 23.
 - 2.5.3 Malleable Beam Clamps: MSS Type 30.
 - 2.5.4 Side Beam Brackets: MSS Type 34.

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- 2.5.5 Concrete Inserts: MSS Type 18.
- 2.6 Saddles and Shields: Except as otherwise indicated, provide saddles or shields under piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.
- 2.6.1 Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.
- 2.6.2 Protection Saddles: MSS Type 39; use with rollers, fill interior voids with segments of insulation matching adjoining insulation.
- 2.7 Miscellaneous Materials:
- 2.7.1 Metal Framing: Provide products complying with NEMA STD ML 1.
- 2.7.2 Steel Plates, Shapes and Bars: Provide products complying with ANSI/ASTM A 36.
- 2.7.3 Cement Grout: Portland cement (ANSI/ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ANSI/ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.
- 2.7.4 Heavy-Duty Steel Trapezes: Fabricate from steel shapes or continuous channel struts selected for loads required; weld steel in accordance with AWS standards.
- 3 EXECUTION
- 3.1 Preparation
- 3.1.1 Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachments.
- 3.1.2 Prior to installation of hangers, supports, anchors and associated work, Installer shall meet at project site with Contractor, installer of each component of associated work, and installers of other work requiring coordination with work of this section for purpose of reviewing material selections and procedures to be followed in performing the work in compliance with requirements specified.
- 3.2 Installation of Building Attachments:
- 3.2.1 Install building attachments at required locations within concrete or on structural steel for proper piping support. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional building attachments where support is required for additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert

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securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts.

- 3.2.2 In areas of work requiring attachments to existing concrete, use self drilling rod inserts, Phillips Drill Co., "Red-Head" or equal.
- 3.3 Installation of Hangers and Supports:
- 3.3.1 General: Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings complying with MSS SP-69 or as listed herein, whichever is most limiting. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.
- 3.3.1.1 Horizontal steel pipe and copper tube 1-1/4" diameter and smaller: support on 6 foot centers.
- 3.3.1.2 Horizontal steel pipe and copper tube 1-1/2" diameter and larger: support on 10 foot centers.
- 3.3.1.3 Vertical steel pipe and copper tube: support at each floor.
- 3.3.1.4 Plastic pipe: support in accordance with manufacturer's recommendations and the Florida Building Code, Plumbing.
- 3.3.1.5 Fire protection piping: support in accordance with NFPA 13.
- 3.3.2 Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories.
- 3.3.3 Paint all black steel hangers with black enamel. Galvanized steel and copper clad hangers do not require paint.
- 3.3.4 Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.
- 3.3.5 Provision for Movement:
- 3.3.5.1 Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.
- 3.3.5.2 Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
- 3.3.5.3 Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 are not exceeded.

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- 3.3.6 Insulated Piping: Comply with the following installation requirements.
- 3.3.6.1 Shields: Where low-compressive-strength insulation or vapor barriers are indicated, install coated protective shields.
- 3.3.6.2 Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
- 3.3.7 Support fire protection piping independently of other piping.
- 3.4 Installation of Anchors:
- 3.4.1 Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31, and to prevent transfer of loading and stresses to connected equipment.
- 3.4.2 Fabricate and install anchors by welding steel shapes, plates and bars to piping and to structure. Comply with ANSI B31 and with AWS standards.
- 3.4.3 Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and elbows. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.
- 3.4.4 Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions to limit movement of piping and forces to maximums recommended by manufacturer for each unit.
- 3.5 Equipment Bases:
- 3.5.1 Provide concrete housekeeping bases for all floor mounted equipment furnished as part of the work of Division 23. Size bases to extend minimum of 4" beyond equipment base in any direction; and 4" above finished floor elevation. Construct of reinforced concrete, roughen floor slab beneath base for bond, and provide steel rod anchors between floor and base. Locate anchor bolts using equipment manufacturer's templates. Chamfer top and edge corners.
- 3.5.2 Provide structural steel stands to support equipment not floor mounted or hung from structure. Construct of structural steel members or steel pipe and fittings. Provide factory-fabricated tank saddles for tanks mounted on steel stands. Prime and paint with black enamel.

END OF SECTION 230529

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SECTION 230548 - VIBRATION ISOLATION

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-23 section making reference to vibration isolation equipment.
- 1.3 Extent of vibration isolation required by this section is indicated on drawings and/or specified in other Division-23 sections.
- 1.4 Approval Submittals: When required by other Division-23 sections, submit product data sheets for each type of vibration isolation equipment including configuration and rating data. Submit with Division-23 section using vibration isolation, not as a separate submittal. Provide calculations showing supported weight, deflection, and isolator size and type for each item of supported equipment. Submit for:
- Equipment Mountings. Type EM.
Hangers. Type HA.
Bases and Frames. Type BF.
Pipe Flexible Connections. Type PF.
- 1.5 O&M Data Submittals: Submit a copy of approval submittals for each type of vibration isolation equipment. Include this data in O&M Manual.

2 PRODUCTS

- 2.1 General: Provide factory-fabricated products recommended by manufacturer for use in service indicated. Provide products of types and deflections indicated; provide proper selection as determined by Installer to comply with specifications and installation requirements. Provide sizes which properly fit with equipment. All metal parts installed outside shall be hot dipped galvanized after fabrication.
- 2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide vibration isolation equipment of: Mason Industries, Keflex, Consolidated Kinetics, Vibration Mountings & Controls, Wheatley or approved equal. All vibration isolators shall be supplied by a single approved manufacturer.
- 2.3 Equipment Mountings:
- 2.3.1 Select mountings with the required deflection and fastening means. Provide steel rails or bases as required to compensate for equipment rigidity and overhang.
- 2.3.2 Types of equipment mountings (EM):

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- 2.3.3 Spring Mountings (EM1): Spring isolators shall be free-standing and laterally stable without any housing. All mounts shall have leveling bolts. Spring diameter shall be not less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Springs shall be so designed that the ratio of horizontal stiffness to vertical stiffness is approximately one. Provide a nominal static deflection of at least 1.0". Basis of Design: Mason Industries SLFH.
- 2.3.4 Spring Mountings with Housings (EM2): Spring isolators shall consist of open, stable steel springs and include vertical travel limit stops to control extension when weight is removed. The housing of the spring unit shall serve as blocking during erection of equipment. Provide a nominal static deflection of at least 1.0". All mountings used outside shall be hot dipped galvanized. Basis of Design: Mason Industries SLR.
- 2.3.5 Spring Mountings with Housings (EM3): Spring isolators shall consist of open, stable steel springs with neoprene inserts to limit movement between upper and lower housing on start and stop. Provide a nominal static deflection of at least 1.0". Mountings shall be specifically designed for critical areas on light-weight floors. Basis of Design: Mason Industries C.
- 2.3.6 Neoprene Mountings (EM4): Double deflection neoprene-in-shear mountings shall have a minimum static deflection of 0.35". All metal surfaces shall be neoprene covered. The top and bottom surfaces shall be neoprene ribbed and bolt holes shall be provided in the base. Basis of design: Mason Industries ND.
- 2.3.7 Pads (EM5): Waffle or ribbed pattern neoprene pads shall be fabricated from 40-50 durometer neoprene. Provide rigid steel plate and mounting angles as required. Basis of design: Mason Industries Super W.
- 2.4 Hangers:
- 2.4.1 Select hangers with the required deflection. Provide all required hanger rods and fasteners.
- 2.4.2 Types of hangers (HA):
- 2.4.2 Hangers (HA1): Vibration hangers shall contain a steel spring set in a neoprene cup manufactured with a grommet to prevent short-circuiting of the hanger rod. The cup shall contain a steel washer designed to properly distribute the load on the neoprene and prevent its extrusion. Spring diameters and hanger box lower-hole sizes shall be large enough to permit the hanger rod to swing through a 30-degree arc before contacting the hole and short circuiting the spring. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Basis of Design: Mason Industries 30.
- 2.4.3 Hangers (HA2): Vibration hangers shall contain a laterally stable steel spring and 0.3" deflection neoprene or fiberglass element in series. A neoprene neck shall be provided where the hanger rod passes through the steel box supporting the isolator mount to prevent metal to metal contact. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30 degree arc before contacting the hole and short circuiting the spring. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Basis of Design: Mason Industries 30N.

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- 2.4.4 Hangers (HA3): Double deflection neoprene-in-sheer or EPDM hangers. Units shall be complete with projected neoprene bushing to prevent steel-to-steel contact between hanger box and hanger rod. Average static deflection shall be not less than 0.4 inches. Basis of Design: Mason Industries HD.
- 2.5 Bases and Frames (BF):
- 2.5.1 Select mounting bases and frames as required for equipment dimensions, service access and fastening means. Provide all fasteners. Coordinate and provide required vibration isolators to match mounting bases and frames.
- 2.5.2 Types of bases and frames (BF):
- 2.5.1 Steel Base Frame for Floor-Mounted Equipment (BF1): Provide frames consisting of structural steel sections sized, spaced and connected to form a rigid base which will not twist, rack, deform or deflect in any manner that will negatively affect the operation of the supported equipment or the performance of the vibration-isolation mounts. Frames shall be of adequate size and plan form to support basic equipment units and motors plus any associated pipe elbow or duct elbow supports and electrical control elements or other components closely related and requiring resilient support in order to prevent vibration transfer from equipment to the building structure. Frames shall include side mounting brackets for attachment to vibration isolation floor mounts. The clearance between the underside of any frame or mounted equipment unit and the top of the building structure below shall be at least 2 inches. Basis of Design: Mason Industries WFSL.
- 2.5.2 Concrete Inertia Block for Floor-Mounted Equipment (BF2): Provide concrete inertia blocks formed of stone-aggregate concrete (150 lbs./cu.ft.) cast between appropriate steel reinforcing perimeter structural steel channels. Inertia block thickness shall be not less than 1/12 the longest dimension of the mounted equipment or equipment assembly. Inertia blocks shall be built to form a rigid base which will not twist, rack, deform, deflect or crack in any manner that will negatively affect the operation of the supported equipment or the performance of the vibration-isolation mounts. Inertia blocks shall be of adequate size and plan form to support basic equipment units and motors plus any associated pipe or duct elbow supports, electrical control elements or other components closely related and requiring resilient support in order to prevent vibration transfer from equipment to the building structure. Inertia blocks shall include side mounting bracket pockets for spring mounting. The clearance between the underside of any inertia block and the top of the building structure below shall be at least 2 inches. The vibration isolator supplier may furnish the structural steel perimeter frame, including reinforcing and anchor bolts. Basis of Design: Mason Industries KSL/BMK.
- 2.5.3 Steel Rails (BF3): Provide steel rails of channels or angles with vibration isolators as required. Basis of Design: Mason Industries, RND or RC.
- 2.5.4 Vibration Isolation Base for Rooftop Equipment (BF4): Provide aluminum vibration isolation bases that fit over roof curb and under the equipment. Provide spring isolators having a 1" minimum static deflection, resilient snubbers for wind resistance, closed cell weather seal at top and bottom, and EDPM flexible connection around entire perimeter. The unit shall provide

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a water-tight system. Basis of Design: Mason Industries CMAB.

- 2.5.5 Vibration Isolation Curb for Rooftop Equipment (BF5): Provide steel spring isolation curb with cadmium or zinc electroplated steel springs on ¼" thick neoprene pads to support the upper frame. The upper frame must provide continuous support for the equipment and must be held captive by ¼" thick neoprene snubber bushings. Minimum spring deflection is 1½" . Provide galvanized steel counter-flashing and EPDM bellows for the corners. Provide access covers for all springs. The entire assembly shall be waterproof. Curbs shall be a minimum of 12" high and shall include 2" thick insulation. Provide curbs designed to accommodate for roof pitch so that equipment is set level.
- 2.5.6 Provide perimeter angle and cross members with two layers of 5/8" waterproof sheetrock at the floating member of the curb. Stagger sheetrock joints. Sheetrock must completely surround all ducts and shall be caulked. Where the mechanical arrangement prevents attaching to the floating member, the barrier shall be attached as high as possible on the fixed curb with 1" thick closed cell neoprene flexible seals around the ducts. A 4" layer of 1.5 pcf fiberglass shall cover the entire solid roof surface under the unit. Basis of Design: Mason Industries RSC-dB.
- 2.6 Pipe Flexible Connections:
- 2.6.1 Select pipe flexible connections suitable for duty indicated with ends to match piping system.
- 2.6. Types of pipe flexible connections (PF):
- 2.6.2 Pump Connections (PF1): Provide EPDM and dacron or neoprene and nylon flexible connectors rated at 200 psi and 250°F. Connectors shall have the number of spheres required and ductile iron floating flanges with baked enamel finish. Provide control rods or cables as required for each application. Basis of Design: Mason Industries SFDEJ with reinforcing rings.
- 2.6.3 Chiller Connections (PF2): Provide EPDM and dacron or neoprene and nylon flexible connectors rated at 200 psi and 250°F. Connectors shall have the number of spheres required and ductile iron floating flanges with baked enamel finish. Provide control rods or cables as required for each application. Basis of Design: Mason Industries SFEJ.
- 2.6.4 Coil Connections (PF3): Provide EPDM and dacron or neoprene and nylon flexible connectors rated at 200 psi at 250°F. Connectors shall have the number of spheres required and ductile iron floating flanged or threaded ends with baked enamel finish. Provide control rods or cables as required for each application. Basis of Design: Mason Industries SFU or SFEJ as required.
- 2.6.5 Stainless Steel Flexible Hoses (PF4): Provide 300 psi working pressure flexible hoses with corrugated seamless hose body and braided cover. Basis of Design: Mason Industries BSS threaded or RF flanged, as required.
- 2.6.6 Bronze Flexible Hoses (PF5): Provide 300 psi working pressure flexible hoses with corrugated bronze hose body and braided cover. Basis of Design: Mason Industries BBF with sweat ends.

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3 EXECUTION

3.1 Install vibration isolation devices for the duty indicated and for ease of inspection, adjustment, and proper operation. Install in accordance with the manufacturer's written instructions and coordinate with shop drawings of supported equipment.

3.2 All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.

3.3 Piping, ductwork and conduit shall not be suspended from one another or physically contact one another. Vibrating systems shall be kept free from non-vibrating systems.

3.4 Equipment Mountings:

3.4.1 Unless otherwise shown or specified, all floor-mounted equipment shall be set on housekeeping equipment bases. Refer to Division-23 section "Supports, Anchors, and Seals".

3.4.2 No equipment unit shall bear directly on vibration isolators unless its own frame is suitably rigid to span between isolators, and such direct support is approved by the equipment manufacturer. All support frames shall be sufficiently stiff and rigid so as to prevent distortion and misalignment of components installed thereon.

3.4.3 Align equipment mountings for a free, plumb installation. Isolators that are binding, offset or fully compressed will not be accepted.

3.5 Hangers:

3.5.1 Position vibration isolation hangers so that hanger housing may rotate a full 360 degrees without contacting any object.

3.5.2 Install steel angles, channels, rods and fasteners to level equipment, piping or ductwork and to evenly distribute the supported weight.

3.6 Bases and Frames:

3.6.1 Unless otherwise indicated, all equipment mounted on vibration-isolated bases shall have a minimum operating clearance of 2 inches between the structural steel frame and the concrete housekeeping pad or floor beneath the equipment. The clearance space shall be checked to ensure that no construction debris has been left to short-circuit or restrict the proper operation of the vibration isolation system.

3.7 Pipe Flexible Connections:

3.7.1 Piping connected to vibration isolated equipment shall be installed so that it does not strain or force out of alignment the vibration isolators supporting the basic equipment, nor shall pipes restrict such equipment from "floating" freely on its respective vibration isolation system.

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Flexible connections shall be used to eliminate transferring vibration along piping.

- 3.7.2 Flexible connections and hoses shall not be used to compensate for pipe misalignment. Units shall be aligned so that the flexible connection is not distorted perpendicular to the axis of the piping.
- 3.7.3 Install flexible connections in pump suction and discharge, chiller inlet and outlet, water coil inlet and outlet and where shown on the drawings or required by equipment specifications.
- 3.7.4 Drain piping connected to vibrating equipment shall not physically contact any building construction or non-isolated systems or components.
- 3.8 Connections of Ducts: Ducts shall be connected to fan intakes and discharges by means of flexible connectors in accordance with Division-23 section "Ductwork Accessories" so that all vibrating equipment is fully isolated.

END OF SECTION 230548

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SECTION 230553 - MECHANICAL IDENTIFICATION

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-21, 22 and 23 section making reference to or requiring identification devices specified herein.
- 1.3 Extent of mechanical identification work required by this section is indicated on drawings and/or specified in other Division-21, 22 and 23 sections.
- 1.4 Refer to Division-26 sections for identification requirements of electrical work; not work of this section. Refer to other Division-23 sections for identification requirements for controls; not work of this section.
- 1.5 Codes and Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

2 PRODUCTS

- 2.1 General: Provide manufacturer's standard products of categories and types required for each application as referenced in other Division-23 sections. Where more than single type is specified for application, selection is Installer's option, but provide single selection for each product category.
- 2.2 Painted Identification Materials
- 2.2.1 Stencils: Standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications, but not less than 1-¼" high letters for ductwork and not less than ¾" high letters for access door signs and similar operational instructions.
- 2.2.2 Stencil Paint: Standard exterior type stenciling enamel; black, except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.
- 2.2.3 Identification Paint: Standard identification enamel.
- 2.3 Plastic Pipe Markers
- 2.3.1 Pressure-Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers.

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- 2.3.1.1 Lettering: Manufacturer's standard pre-printed nomenclature which best describes piping system in each instance, as selected by Architect/Engineer in cases of variance with name as shown or specified.
- 2.3.1.2 Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.
- 2.4 Valve Tags:
- 2.4.1 Brass Valve Tags: Provide 19-gage polished brass valve tags with stamp-engraved piping system abbreviation in ¼" high letters and sequenced valve numbers ½" high, and with 5/32" hole for fastener. Provide 1-½" diameter tags, except as otherwise indicated.
- 2.4.2 Plastic Laminate Valve Tags: Provide manufacturer's standard 3/32" thick engraved plastic laminate valve tags, with piping system abbreviation in ¼" high letters and sequenced valve numbers ½" high, and with 5/32" hole for fastener. Provide 1-½" square black tags with white lettering, except as otherwise indicated.
- 2.5 Engraved Plastic-Laminate Signs:
- 2.5.1 General: Provide engraving stock melamine plastic laminate, in the sizes and thicknesses indicated, engraved with engraver's standard letter style a minimum of 3/4" tall and wording indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
- 2.5.2 Thickness: 1/16" for units up to 20 sq. in. or 8" length; 1/8" for larger units.
- 2.5.3 Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.
- 2.5.4 Ceiling Grid Mounted Tags: White 1/2:" lettering engraved in a 3/4" black background, screwed parallel to the ceiling grid.
- 2.6 Stamped Nameplates: Provide equipment manufacturer's standard stamped nameplates for motors, AHUs, pumps, etc.
- 3 EXECUTION
- 3.1 Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.
- 3.2 Ductwork Identification:
- 3.2.1 General: Identify air supply, return, exhaust, intake and relief ductwork with stenciled signs and arrows, showing ductwork service and direction of flow, in black or white. Example:
AHU-1 Supply →

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- 3.2.2 Location: In each space where ductwork is exposed, or concealed only by removable ceiling system, locate signs near points where ductwork originates or continues into concealed enclosures, and at 50' spacings along exposed runs.
- 3.2.3 Access Doors: Provide stenciled signs on each access door in ductwork and housings, indicating purpose of access (to what equipment) and other maintenance and operating instructions, and appropriate and procedural information.
- 3.3 Piping System Identification:
- 3.3.1 General: Install pipe markers of one of the following types on each system indicated to receive identification, and include arrows to show normal direction of flow:
- 3.3.1.1 Plastic pipe markers.
- 3.3.1.2 Stenciled markers, black or white for best contrast.
- 3.3.2 Locate pipe markers as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces and exterior non-concealed locations.
- 3.3.2.1 Near each valve and control device.
- 3.3.2.2 Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.
- 3.3.2.3 Near locations where pipes pass through walls, floors, ceilings, or enter non-accessible enclosures.
- 3.3.2.4 At access doors, manholes and similar access points which permit view of concealed piping.
- 3.3.2.5 Near major equipment items and other points of origination and termination.
- 3.3.2.6 Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.
- 3.3.2.7 On piping above removable acoustical ceilings, except omit intermediately spaced markers.
- 3.3.3 The following piping shall be color-coded where exposed in mechanical and electrical rooms by completely painting the piping with the indicated color. Use standard colors where exposed in finished spaces. Use standard identification methods in concealed areas.
- Fire protection piping - Red
- 3.4 Valve Identification: Provide coded valve tag on every valve, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibs, and shut-off valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use

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fixtures and units. Coordinate code with operating instructions. For valves located above acoustical lay in ceilings provide an additional engraved plastic valve tag, mechanically affixed to the ceiling grid below the valve (white letters on black background). When multiple equipment and/or valve tags are installed in a room, orient all tags the same direction.

- 3.5 Valve Charts: Provide framed, glass covered valve charts in each mechanical room. Identify coded valve number, valve function, and valve location for each valve. Provide floor plan with approximate location of each valve identified.
- 3.6 Mechanical Equipment Identification: Install engraved plastic laminate sign on a vertical surface on or near each major item of mechanical equipment and each operational device. Label shall indicate type of system and area served. Provide signs for the following general categories of equipment and operational devices: For equipment located above acoustical lay in ceilings provide an additional engraved plastic tag, mechanically affixed to the ceiling grid at the access point (white letters on black background). When multiple equipment and/or valve tags are installed in a room, orient all tags the same direction.
- 3.6.1 Main control and operating valves, including safety devices.
- 3.6.2 Meters, gauges, thermometers and similar units.
- 3.6.3 Fuel-burning units including boilers, furnaces, and heaters.
- 3.6.4 Pumps, compressors, chillers, condensers, and similar equipment.
- 3.6.5 Heat exchangers, coils, evaporators, cooling towers, heat recovery units and similar equipment.
- 3.6.6 Fans, blowers, primary balancing dampers and VAV boxes.
- 3.6.7 HVAC air handlers and fan coil units.
- 3.6.8 Air conditioning indoor and outdoor units.
- 3.7 Stamped Nameplates: Equipment manufacturers to provide standard stamped nameplates on all major equipment items such as motors, pumps, AHUs, etc. Where motors are hidden from view (within equipment casing, or otherwise not easily accessible, etc.), the equipment supplier shall furnish a duplicate motor data nameplate to be affixed to the equipment casing in an easily visible location, unless data is already included on the equipment nameplate.]
- 3.8 Adjusting and Cleaning:
- 3.8.1 Adjusting: Relocate any mechanical identification device which has become visually blocked by work of this division or other divisions.
- 3.8.2 Cleaning: Clean face of identification devices, and glass frames of valve charts.

END OF SECTION 230553

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SECTION 230590 - START-UP REQUIREMENTS FOR HEATING, VENTILATING, & AIR
CONDITIONING (HVAC) SYSTEMS

1 GENERAL

1.1 Intent: It is the intent of this section to require that the startup requirements and report noted herein be performed prior to starting TAB work on each system. Work can be phased with permission of the Engineer.

1.2 Coordination:

1.2.1 The Contractor shall furnish to the TAB Contractor a complete set of plans, specifications, addenda, shop drawings, equipment performance data sheets, change orders, etc. as requested by the TAB Contractor.

1.2.2 The Contractor shall participate in a TAB coordination meeting to discuss interface requirements with the TAB Contractor and to establish a schedule for TAB work prior to start of TAB work. The TAB will be performed by an independent company contracted by the owner.

1.3 Test Reports and Verification Submittals:

1.3.1 Submit Startup Report as described herein for each system. Attach Factory Startup Report for equipment as required by other Division-23 sections.

2 PRODUCTS: None

3 EXECUTION:

3.1 The TAB work shall not commence until the Engineer has received written notice from the Contractor that HVAC systems are 100% complete and are fully operational. Submit Startup Report as described herein.

3.2 The Contractor shall place all HVAC systems and equipment into complete operation during each working day of TAB work.

3.3 The Contractor shall provide access to HVAC systems and equipment by supplying ladders and/or scaffolding, and opening access panels and equipment room doors.

3.4 The TAB Contractor will provide to the Contractor TAB punch lists of non-complying HVAC work as they are discovered. The Contractor shall replace or repair non-complying work as soon as possible in order not to delay completion of TAB work.

3.5 Airside Systems: The Contractor shall provide the following information to the Engineer to substantiate proper start-up and preliminary adjustments of air handler units, belt driven fans, and duct systems.

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- 3.5.1 Verify that air grilles (supply, return, exhaust, transfer, outdoor, etc.) are installed and connected to the duct system.
- 3.5.2 Verify that duct systems are clean of debris.
- 3.5.3 Verify that ducts attached with flexible connectors are aligned within ½" and have a uniform gap between ducts of 1"-1.5". Flexible connectors shall not leak and shall be insulated.
- 3.5.4 Verify that filters are clean and filter spacers are installed.
- 3.5.5 Verify that balancing dampers at grilles and branch ducts are operational and are fully opened.
- 3.5.6 Verify that fire and smoke dampers are correctly installed and are fully opened.
- 3.5.7 Verify that fan discharges are appropriate for the outlet ductwork with regards to the "system effect" per AMCA Publication 201. Inappropriate fan discharges will not be accepted.
- 3.5.8 Verify proper fan rotation.
- 3.5.9 Verify proper belt drive alignment.
- 3.5.10 Verify fan motor overload elements are correctly sized.
- 3.5.11 Adjust fan sheave until CFM is at or above design CFM. Provide additional sheaves and belts as required. Verify that motor is not overloaded.
- 3.5.12 Verify that HVAC control systems are fully operational.
- 3.6 Hydronic Systems: The Contractor shall provide the following information to the Engineer to substantiate proper start-up and preliminary adjustments of HVAC pumps and piping systems.
 - 3.6.1 Verify that the hydronic systems are properly flushed, filled, vented, purged and chemically treated and that all leaks are repaired. Verify proper air venting.
 - 3.6.2 Verify that the correct strainer screens are clean and installed.
 - 3.6.3 Verify that pump/motor shafts are correctly aligned.
 - 3.6.4 Verify proper pump rotation and flow direction.
 - 3.6.5 Verify that all balancing valves and circuit setters are fully opened.
 - 3.6.6 Verify that test ports, pressure gauges and thermometers are properly installed and are accessible at coils, boilers, pumps, and chillers. Extensions to allow for pipe insulation are required. Pressure gauges at pumps must utilize pump taps in order for head measurements to correlate with the pump performance curves.
 - 3.6.7 Verify pump motor overload elements are correctly sized.

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- 3.6.8 Adjust balancing valve at pump discharge until GPM is at or greater than design GPM. Verify motor is not overloaded.
- 3.6.9 Provide flow meter data (IN WC and GPM), pump performance chart with flow data plotted, actual motor volts/amps, rated motor volts/amps and motor overload element capacity.
- 3.6.10 Verify that HVAC control systems for coils, boilers, and chillers are fully operational.
- 3.7 VAV Systems: The Contractor shall provide the following information to the Engineer to substantiate the proper start-up and preliminary adjustments of variable air volume boxes and control systems.
- 3.7.1 Verify that the inlet duct to the box is straight for a minimum of five (5) inlet duct diameters.
- 3.7.2 Verify that the discharge duct from the box has no branch takeoffs within five (5) feet of the box discharge.
- 3.7.3 Set the box thermostat to 85°F. Verify that the box modulates to minimum cooling, and the heating activates.
- 3.7.4 Set the box thermostat to 55°F. Verify that the reverse operation occurs and the box modulates to maximum cooling.
- 3.7.5 Set box thermostat to 75°F. Deadband shall not exceed 2°F.
- 3.7.6 Set minimum and maximum CFM based on manufacturer's calibration curves.
- 3.7.7 Verify that the static pressure probe is located 75% of the distance down the longest duct run. Mark the location of the probe on the as-builts and notify the TAB Contractor of same.
- 3.7.8 Verify that the static pressure control properly modulates the AHU fan's variable frequency drive. Set static pressure controller to maintain 1 in. w.g. as the initial setting.
- 3.7.9 Verify that the supply air temperature controller properly modulates the chilled water control valve. Set controller to maintain 55°F. Verify that all heating coil control valves are properly modulated.
- 3.8 Startup Report: The Contractor shall submit the startup information required by this section to the Engineer in a typed report organized as outlined herein. The Startup Report is required to meet the written notice described herein prior to starting TAB work. TAB work will not start until the Startup Report has been submitted and approved.

END OF SECTION 230590

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SECTION 230591 - TESTING, CLEANING, AND STERILIZATION OF PIPING SYSTEMS

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-23 section making reference to or requiring the testing and other procedures specified herein.
- 1.3 Notify the Architect/Engineer when system tests are ready to be witnessed at least 24 hours prior to the test.
- 1.4 All materials, test equipment, and devices required for cleaning, testing, sterilizing or purging shall be provided by the Contractor.

2 PRESSURE TESTS

- 2.1 General: Provide temporary equipment for testing, including pump and gauges. Test piping systems before insulation is installed wherever feasible, and remove control devices before testing. Test each natural section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with indicated medium and pressurize for indicated pressure and time.
- 2.2 Required test period is four hours.
- 2.3 No piping, fixtures, or equipment shall be concealed or covered until they have been tested. The contractor shall apply each test and ensure that it is satisfactory for the period specified before calling the Architect/Engineer to observe the test. Test shall be repeated upon request to the satisfaction of those making the inspection.
- 2.4 Observe each test section for leakage at the end of the test period. Test fails if leakage is observed or if pressure drop exceeds 5% of the test pressure.
- 2.5 Check of systems during application of test pressures should include visual check for water leakage and soap bubble or similar check for air and nitrogen leakage.
- 2.6 During heating and cooling cycles, linear expansion shall be checked at all elbows and expansion joints for proper clearance.
- 2.7 Repair piping systems sections which fail required piping test. Disassemble and re-install using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.
- 2.8 Pressure Test Requirements:

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- 2.8.1 Soil, Waste, and Vent Test all piping within the building with a 10 foot head of water. Test piping in sections so that all joints are tested. Provide test tees as required.
- 2.8.2 Domestic Water: Perform hydrostatic test on all piping within the building at twice the normal static pressure at service point, but not less than 100 psig. Once tested, flush out piping and leave under pressure of the supply main or 40 psig for the balance of the construction period.
- 2.8.3 Fire Sprinkler System: Perform hydrostatic test at 200 psig.

3 CLEANING AND STERILIZATION

- 3.1 General: Clean exterior surfaces of installed piping systems of superfluous materials, and prepare for application of specified coatings (if any). Flush out piping systems with clean water or blowdown with air before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.
- 3.2 Flush and drain all water systems at least three times. Reverse flush systems from smallest piping to largest piping. Replace startup strainers with operating strainers.
- 3.3 Sterilization of Domestic Water Systems:
- 3.3.1 Prerequisites: All new hot and cold water piping installed (complete), all fixtures connected, system flushed out, and system filled with water.
- 3.3.2 The shut off valve at the water main shall be closed, all fixture outlets opened slightly, and a sterilizing solution shall be introduced at a manifold connection installed by the Contractor at the meter.
- 3.3.3 The solution shall contain 50 parts per million of available chlorine. The chlorinating material shall be either liquid chlorine or calcium hypochlorite. The solution shall be allowed to stand in the system for at least eight hours after which the entire system shall be flushed.
- 3.3.4 After final flushing, all aerators shall be removed, cleaned, and reinstalled. After final flush the residual chlorine shall not exceed 0.2 parts per million.
- 3.3.5 The Architect/Engineer shall be notified 24 hours prior to the procedure so that it can be witnessed.
- 3.3.6 Provide sampling and certified report by an independent testing lab. Provide written Health Department approval of disinfection samples.

END OF SECTION 230591

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SECTION 230593 - TESTING AND BALANCING OF MECHANICAL SYSTEMS

1 GENERAL

1.1 The work of this section is intended to be performed by a test and balance contractor under a separate, stand-alone contract.

1.2 Description of Work:

1.2.1 Extent of testing, adjusting, and balancing work (TAB) is indicated by requirements of this section, and also by drawings and schedules, and is defined to include, but is not necessarily limited to, air distribution systems, hydronic distribution systems and associated equipment and apparatus of mechanical work. The work consists of setting speed and volume (flow) adjusting facilities provided for systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to work as required.

1.2.2 Coordination: Coordinate with the General Contractor and Mechanical Contractor responsible for the HVAC system installation as required to complete the TAB work.

1.3 The intent of this specification is to balance HVAC systems within the tolerances listed, maintaining the pressure relationships indicated, with a minimum of noise.

1.3.1 Airflow Tolerances:

1.3.1.1 Air Handling: The supply air, return air and outdoor air quantities shall be balanced within 5% of design values.

1.3.1.2 Exhaust Fans: The exhaust fan quantities shall be set as required to maintain the design exhaust terminal flows within 5% of design values. If no exhaust terminals exist, exhaust fan air quantities shall be balanced within 10% of design values.

1.3.1.3 Terminal Units: The air quantities associated with VAV boxes, fan coil units, self-regulating air valves, unit heaters and other similar devices shall be balanced within 5% of design values.

1.3.1.4 Ceiling Diffusers, Supply Registers, Return and Exhaust Inlets: Balance to an air quantity within 10% of the design values.

1.3.2 Temperature Tolerances:

1.3.2.1 Air Handling Temperatures: The controlled temperatures at AHUs shall be verified to be under control within 1°F of design values.

1.3.2.2 Chilled Water Temperatures: The chilled water controlled temperature from chillers shall be under control within 1°F.

1.3.2.3 Room Temperatures: Balance systems and controls within 2°F of indicated settings.

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- 1.3.3 Hydronic Flow: Balance hydronic flow rates to within 10% of design values.
- 1.4 Quality Assurance: The TAB Contractor shall be located within 125 miles of the job site and certified as one of the following:
- 1.4.1 Tester: A firm certified by National Environmental Balancing Bureau (NEBB) in those testing and balancing disciplines required for this project, who is not the Installer of the systems to be tested and is otherwise independent of the project. Comply with NEBB's "Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems" as applicable to this work.
- 1.4.2 Tester: A firm certified by Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project. AABC-certified firms are independent by definition. Comply with AABC's Manual MN-1 "AABC National Standards", as applicable to this work.
- 1.4.3 Industry Standards: Comply with American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) recommendations pertaining to measurements, instruments and testing, adjusting and balancing, except as otherwise indicated.
- 1.5 Job Conditions:
- 1.5.1 Do not proceed with testing, adjusting, and balancing work until HVAC work (including Controls) has been completed and is operable. Ensure that there is no residual work still to be completed.
- 1.5.2 Do not proceed until work scheduled for testing, adjusting, and balancing is clean and free from debris, dirt and discarded building materials.
- 1.5.3 Do not proceed until architectural work that would affect balancing (walls, ceiling, windows, doors) have been installed.
- 1.5.4 Testing may proceed system by system, but each HVAC system must be complete as describe herein.
- 1.5.5 The mechanical contractor shall make any changes in pulleys, belts, and dampers, and/or add dampers as required for correct balancing.
- 1.6 Approval Submittals
- 1.6.1 Submit the name of the proposed test and balance company for the Engineer's approval within thirty (30) days after awarding of contract.
- 1.7 Test Reports and Verification Submittals:
- 1.7.1 Submit four (4) copies of the dated test and balance report upon completion of TAB work. The report shall include a list of instruments used for the work. The report shall be signed by

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the supervisor who performed the TAB work.

2 PRODUCTS

2.1 Patching Materials: Except as otherwise indicated, use same products as used by original Installer for patching holes in insulation, ductwork and housings which have been cut or drilled for test purposes, including access for test instruments, attaching jigs, and similar purposes.

2.2 Test Instruments: Utilize test instruments and equipment of the type, precision, and capacity as recommended in the referenced standard. All instruments shall be in good condition and shall have been calibrated within the previous six (6) months (or more recently if required by standard).

3 EXECUTION

3.1 General:

3.1.1 Examine installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned and is operable. Do not proceed with TAB work until unsatisfactory conditions have been corrected in manner acceptable to Tester.

3.1.2 Test, adjust and balance environmental systems and components, as indicated, in accordance with procedures outlined in applicable standards, and as modified or detailed herein.

3.1.3 Test, adjust and balance systems during summer season for air conditioning systems and during winter season for heating systems, including at least a period of operation at outside conditions within 5°F wet bulb temperature of maximum summer design condition, and within 10°F dry bulb temperature of minimum winter design condition. When seasonal operation does not permit measuring final temperatures, then take final temperature readings when seasonal operation does permit. The Contractor shall return for a change of seasons test at no additional cost to the Owner and submit the revised TAB report.

3.1.4 Punch List: Prepare a deficiency (punch)list for the Contractor with a copy of the Engineer that lists all items that are incorrectly installed or are functioning improperly. Provide a retest after all items are corrected.

3.1.5 Prepare TAB report of test results, including instrumentation calibration reports, in format recommended by applicable standards, modified as required to include all data listed herein.

3.1.6 Patch holes in insulation, ductwork and housings, which have been cut or drilled for test purposes, in manner recommended by original Installer.

3.1.7 Permanently Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings at completion of TAB work. Provide markings with paint or other suitable permanent identification materials.

3.1.8 Include in the TAB report recommendations for correcting unsatisfactory mechanical

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performances when system cannot be successfully balanced.

3.1.9 Include an extended warranty of ninety (90) days after completion of test and balance work, during which time the Engineer, at his discretion, may request a recheck, or resetting of any component as listed in test report. The TAB company shall provide technicians and instruments and make any tests required by the Engineer during this time period.

3.2 Controls

3.2.1 Check all HVAC controls for proper location, calibration and sequence of operation.

3.2.2 Check operation of all controllers and controlled devices to verify proper action and direction. Check the operation of all interlocks.

3.2.3 Check all zone damper motors for leakage when in closed position. If leakage is more than 5%, mechanical contractor shall reset damper linkages.

3.2.4 Check all control valves for complete closure and correct action under all operating conditions.

3.3 Air Balancing

3.3.1 Leakage tests on ductwork must have been completed before air balancing.

3.3.2 Set dampers, volume controls and fan speeds to obtain specified air delivery with minimum noise level. Rebalance as required to accomplish this. Simulate fully loaded filters during test.

3.3.3 Set grille deflections as noted on plans. Modify deflections if required to eliminate drafts or objectionable air movement.

3.3.4 Record air terminal velocity after completion of balance work.

3.3.5 Record final grille and register deflection settings if different from that specified on contract drawings.

3.3.6 Record all fan speeds.

3.3.7 Variable Volume Systems: Measure static pressure at all major branches. Adjust fan controllers for minimum required static pressure at the end of each branch. Report the value of the minimum static pressure that will provide proper air flow in the TAB Report and set the static pressure controller for this value. Balance outlets. Check at both modulated and full cooling condition. Traverse main supply and return ducts. Balance the return system. All branches must be above the minimum required static pressure. The supply fan must track and deliver the proper air quantity with no objectionable noise. The system must be stable and operate properly at 30% load. Determine minimum fan speed to achieve minimum scheduled supply and outside air flows.

3.4 Water Balancing:

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- 3.4.1 Verify proper operation of all hydronic system devices to ensure the proper flowrate, flow direction and pressure are maintained.
- 3.4.2 Set balancing cocks and flow control devices to obtain specified water flow rates to all terminal units, coils, chillers, cooling towers, boilers, and heat exchangers. Coordinate set point for variable speed drives to achieve balance with minimum pump speed. Report the value of the minimum differential pressure that will provide proper flow in the TAB Report and set the differential pressure controller for this value. Pump balancing cocks (if present) shall be fully open. Set maximum speed control for variable speed pumps.
- 3.4.3 Variable Speed Pumps: Verify proper operation of variable speed pumps and the associated distribution system at 30% and 100% flow.
- 3.5 Data Collection:
- 3.5.1 In addition to the data required for any specified performance tests, measure and record the temperatures, pressures, flow rates, and nameplate data for all components listed herein.
- 3.5.2 It is the intent of this section to record data on balanced systems, under normal operating or design conditions.
- 3.5.3 Temperatures:
1. Outside dry and wet bulb temperatures.
 2. Dry bulb temperature in each room and at least one wet bulb temperature in each zone.
 3. Inlet and outlet temperature of each heat exchange device - both fluids.
- 3.5.4 Pressures:
1. Suction and discharge static pressure of each fan.
 2. Suction and discharge pressure of each pump.
 3. Water pressure drop through each heat exchanger.
- 3.5.5 Flow rates:
1. Flow rate through each fan.
 2. Flow rate through each pump.
 3. Flow rate through each coil or heat exchange device.
- 3.5.6 Nameplate Data:
1. Complete nameplate data for all equipment.
 2. Motor data to include horsepower, phase, voltage, RPM, full load nameplate current, fuse rating in disconnect switch, number or manufacturer's size designation, and ampere rating of overcurrent and low voltage protection devices in starters.
- 3.6 All test openings in ductwork and ductwork insulation shall be sealed with flanged mounted screwed cap instrument test holes, Ventfabrics Model 699 or equal.

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END OF SECTION 230593

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SECTION 230713 - EXTERIOR INSULATION FOR DUCTWORK

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Approval Submittals:

1.3.1 Product Data: Submit producer's data sheets and installation instructions on each insulation system including insulation, coverings, adhesives, sealers, protective finishes, and other material recommended by the manufacturer for applications indicated. Submit for:

Rigid duct insulation
Flexible duct insulation

1.4 O&M Data Submittals: Submit a copy of all approval submittals. Include in O&M Manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide insulation products by Knauf, Owens-Corning, Johns Manville, Certainteed.

2.2 Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, coverings, sealers, mastic, and adhesive) with a flame spread rating of 25 or less, and a smoke-developed rating of 50 or less as tested by ANSI/ASTM 84.

2.3 Rigid Fiberglass Insulation Board: ASTM C612, Class 1 (non load bearing). Boards shall be 3 pcf density with UL rated aluminum foil vapor barrier (FSK).

2.4 Flexible Fiberglass Insulation: ASTM C553, Type I, Class B-3 (temperature less than 350°F). Duct wrap shall be 1 pcf density with UL rated aluminum foil vapor barrier (FSK).

2.5 General Purpose Mastic: Benjamin Foster 35-00 Series, Insulcoustic VIAC Mastic, Childers CP-10, or approved equal. The final selection of this product for the specific application indicated is the responsibility of the insulation supplier. The insulation system must meet the specified application.

2.6 Vapor Barrier Sealant: Benjamin Foster 30-35, Insulcoustic IC-501, 3M EC-1378, Childers CP-30, or approved equal. Provide "Low Odor" type. The final selection of this product for the specific application indicated is the responsibility of the insulation supplier. The insulation system must meet the specified application.

2.7 Adhesive: Benjamin Foster 85-20, Insulcoustic IC-205, 3M EC-35, Childers CP-82, Childers CP-89, or approved equal. The final selection of this product for the specific application

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indicated is the responsibility of the insulation supplier. The insulation system must meet the specified application.

2.8 Fiber-Glas Mesh: 10x10 Mesh. Foster Mastafab or equal.

3 EXECUTION

3.1 Insulate all rectangular supply, return and outdoor air ductwork exposed in mechanical rooms, mezzanines, fan lofts or in any finished spaces with 1½" thick rigid fiberglass insulation with vapor barrier.

3.2 Installation of Rigid Insulation:

3.2.1 Clean and dry ductwork prior to insulating. Butt insulation firmly together to ensure complete and tight fit over surfaces to be covered. Install insulation materials with smooth and even surfaces. Maintain integrity of aluminum vapor barrier wherever possible. Extend insulation without interruption through walls, floors and similar ductwork penetrations except where otherwise indicated.

3.2.2 Install with facing to the outside with a maximum of 25% compression. Butt all insulation joints firmly together. Longitudinal seam of the vapor retarder must be overlapped a minimum of 2". Staples shall be outward clinch and placed approximately 6" on center. All penetrations, joints, seams, and damage to the facing shall be sealed with glass fabric and mastic prior to system startup. For rectangular ducts over 24" wide, secure the insulation to the bottom of the duct with mechanical fasteners spaced on 12" centers to reduce sag. Do not overcompress the insulation with the retainer. Larger ducts shall be secured with fasteners on 12-inch centers and 3 inches from all edges.

3.2.3 Apply open mesh glass fabric embedded in vapor barrier mastic. Then apply a second coat of general purpose mastic with aluminum grey color. This finish shall be complete over all rigid insulation.

3.3 Insulate all supply, return and outdoor air ductwork concealed above ceilings, in chases, or elsewhere, and the backs of all ceiling supply outlets with 2" thick fiberglass blanket insulation with vapor barrier.

3.4 Installation of Flexible Insulation:

3.4.1 Insulate round elbows and fittings with wrap such that thickness is equal to adjoining duct covering. Clean and dry ductwork prior to insulating.

3.4.2 Adhere insulation to duct with 50 percent coverage using approved insulation adhesive applied in 6-inch wide swaths with 6-inch spaces between swaths. Additionally secure insulation with perforated pins and Tuff-Bond or by self-sticking pins with a 3/8" self-tapping screw. Space on 12-inch centers and 3 inches from all edges. Ducts up through 24" wide only require one row of pins. Ducts over 24" wide shall have pins spaced as described herein.

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- 3.4.3 Lap all joints 2 inches and seal joints with 4-inch wide strips of open mesh glass fabric embedded in two coats of general purpose mastic.
- 3.4.4 Seal all punctures and breaks in aluminum vapor barrier with open mesh glass fabric and vapor barrier sealant.

END OF SECTION 230713

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SECTION 230923 - REFRIGERANT MONITORING SYSTEM

1. GENERAL

1.1 RELATED DOCUMENTS

1.2 Contractor shall become familiar with requirements for Refrigerant Monitoring and Equipment Work specified in the construction documents and Electrical Work specified in Division-26. Installation practices shall conform to Division-23 general mechanical and Division-26 general electrical practices and following material and installation specification.

1.31.2 Refrigerant gas detection system supplier /installer shall be familiar with standard practices of safety and installation for refrigerant gas monitor systems. (Unlisted gas detection supplier shall provide a list of last 12 similar projects.) Acceptable suppliers:

Thermal Gas Systems, Inc. Halogard or equal

System shall be a complete system by a single supplier and point of responsibility.

System shall meet or exceed the latest ASHRAE Standard 15-2010 requirement Canadian Standard B52-1995 and EPA standard CFR. System shall incorporate all latest revisions to bring up to current standards.

2. PRODUCTS

2.1 GENERAL: Provide Refrigerant Monitoring System (RMS) control with BACnet interface to building energy management system.

2.2 Monitor shall employ photoacoustic Infrared (IR) sensor technology, for sensing down to one part per million (ppm), and calibrated for specific refrigerant R134a (coordinate with chiller supplier if alternate manufacturer is supplied). Monitor shall continuously measure and display the specified gas concentration. Shall be capable of detecting presence of refrigerant which is selected without significant response to other refrigerants which might be present. System shall be capable of indicating, alarming, shutting down equipment, and automation/ventilation interface. Where combustion equipment is employed, monitoring system shall automatically shut down the combustion equipment in event of refrigerant leakage if other acceptable conditions are not specified.

2.3 Multiple chiller installations shall carefully consider whether mechanical room size and layout can adequately be monitored to comply with regulations with a single point or a multiple point system.

2.4 Monitor System Configuration - System shall conform to the design specifications as follows.

2.4.1 Description - Monitor shall activate an alarm and mechanical equipment room ventilation at less than the TLV-TWA. Sample pick-up shall be located in an area where refrigerant from a leak will concentrate (ASHRAE-15 1994).

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2.4.2 The monitor shall be wall mount type for continuous monitoring.

Enclosure - The enclosure shall be NEMA 12/4/250 design type.

Enclosure shall be no more than 14 inches in any dimension.

Mounting Points shall be integral to enclosure.

All displays shall be visible from front panel. Displayed information shall include Refrigerant Type and Concentration, sample location, and self diagnostic condition reports (faults). LED's shall indicate Power, Ready, Alarm 1, Alarm 2, Alarm 3, and any fault condition. All LED's shall have a corresponding NO/NC relay so that the same information can be remotely displayed.

Analog output shall be provided when required for remote recording of gas concentration. Monitor shall be able to transmit gas concentration and self-diagnostic information up to 1000 ft. (optional).

Coverage shall be expandable with Two (2), Four (4), or Eight (8) Channel Scanner (Optional).

TWA Integration – When TLV-TWA exposure limit for the specific refrigerant is less than the full-scale range of the monitor, monitor shall calculate an 8 hr. time weighted average (TWA) exposure. TWA concentration shall be displayed on LCD. Alarm LED shall be activated if preprogrammed TWA exposure limit is exceeded (Optional).

Monitor shall employ an internal pump to draw samples up to 300 ft.
Sample Tubing extension lengths shall be minimized.

Accuracy - The display accuracy shall be +/- 1 ppm in the 0 - 100 ppm range and +/- 10% of reading or better for values over 100 ppm.

Operating Temperature - 40°F to 120°F non-condensing

2.4.3 Monitor Design Requirements

Display - A 2 line LCD shall be provided for display of sensor location, gas type and concentration, alarm type, malfunction diagnostics and set-up information. Self-diagnostics to include IR source check, sample pump check, chopper function check, temperature and electrical continuity. All error codes are to be plain language, malfunction codes are not permitted.

Alarm Set Points - Three (3) levels of alarm shall be provided for High, Low, and Off Scale conditions. Alarm set points shall be independently adjustable. At least two (2) alarm levels shall be user adjustable at values less than full scale. Relays shall be user selectable Latching or Non-latching.

A third, non-user adjustable alarm shall be provided at greater than the full-scale value. This offscale alarm shall be capable of initiating combustion process shutdown and used to provide

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remote notification to prevent persons from entering a highly-contaminated space without breathing protection.

Visual Alarm Indication – LED’s shall energize for each level of alarm, fault or malfunction. Additional LED’s shall indicate that unit is receiving power and ready for operation.

Relay Outputs – Each alarm set points shall activate a discrete relay. Four (4) dry contacts shall be provided to initiate output signal for three (3) level alarms and malfunction at local panel, interface with both the DDC or BMS and the machine room ventilation system. Contact ratings shall be rated 7 amps at 120 VAC, SPDT, Form C.

Audible Alarm - An audible alarm (90dB) shall energize when alarm condition or fault condition occurs. Audible alarm shall pulse at variable frequency to indicate type of alarm.

Visual Indication - An amber strobe light alarm shall energize when high or offscale alarm or fault condition occurs.

Analog Output Signal - The system shall be capable of providing a 0 - 5 VDC/ 0 - 10 VDC or 4 - 20mA analog signal proportional to gas concentration for interface with DDC or BMS.

2.4.4 Power Requirements - System shall operate on 115 - 230 VAC, 50Hz/60Hz.

2.4.5 Sequential Sampling Capability -Monitor shall be capable of adding up to three (3) additional sampling points (4 point total).

The scanner must be integral to the controller. Scanning time between channels, shall be adjustable 0 to 10 seconds.

Manual override push button shall be provided to hold and display any sensor reading for two minutes.

2.5 Maintenance - System shall require no periodic adjustments other than checking against a clean air source every 6 months. Span calibration frequency shall be no more than once every 12 months. Changes in External Zero Filters and Line Filters are unacceptable. Internal Sample Filters should be visually checked every 6 to 12 months and replaced if needed.

3. EXECUTION

2.6 Examine areas and conditions under which EMCS/DDC work is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.

2.7 Installation of RMS:

2.7.1 General: Install systems and materials in accordance with manufacturer's instructions, shop drawings, and details on drawings. Install electrical components and use electrical products complying with requirements of applicable Division-26 sections of these specifications. Mount panels at convenient locations and heights.

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- 2.7.2 Control Wiring: The term "control wiring" is defined to include wire, conduit and miscellaneous materials as required for mounting and connecting electric control devices. Install all control wiring in conduit.
- 2.7.3 Install control wiring in accordance with the National Electric Code and Division 26 requirements.
- 2.7.4 Label all sensors, safety devices and controllers with engraved tags matching the shop drawings.
- 2.8 Functional Requirements of RMS:
- 2.8.1 Provide all necessary relays, sensors, wiring, strobes, horns, and contacts to achieve proper operation.
- 2.8.2 Coordinate EMCS/DDC work tie in with the digital controls contractor. Provide manufacturer's documentation to translate BACnet data to the DDC system.
- 2.9 Adjusting and Cleaning:
- 2.9.1 Startup: Startup, test, and adjust the RMS in presence of manufacturer's authorized representative. Demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
- 2.9.2 Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.
- 2.9.3 Final Adjustment: After completion of installation, adjust the program, relays, interface devices, and similar equipment provided as work of this section for optimum operation.
- 2.10 Owner's Instructions:
- 2.10.1 During system startup and at such time acceptable performance of the RMS system has been established, the Contractor shall provide on-site operator instruction. This instruction shall be performed during normal working hours and shall be conducted by a competent representative of the Contractor familiar with the system's operation, hardware, and accessories. The Contractor shall maintain a roster of all attendees at all training sessions.
- 2.10.2 Provide at least 14-day notice to Owner and Engineer of training dates.
- 2.11 System Verification: The manufacturer's authorized representative shall state in writing to the Engineer that the RMS system is operating properly, final adjustments and calibrations are complete, and Owner training has been accomplished.

END OF SECTION 230903

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SECTION 23 09 13 - VARIABLE FREQUENCY DRIVES

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Extent of variable frequency drive work required by this section is indicated on drawings and schedules, and by requirements of this section. Motor characteristics are specified in Division-23 section "Electric Motors". Control sequences are specified in the mechanical drawings.
- 1.4 Refer to other Division-23 sections for installation of pumps, AHUs, pressure taps, and flow stations in mechanical systems; not work of this section. Coordinate with pump and air handling unit suppliers.
- 1.5 Refer to Division-26 sections for the following work; not work of this section.
- 1.5.1 Power supply wiring for power source to power connection on pumps, air handling units, drives, controls and/or unit control panels.
- 1.6 Provide the following electrical work as work of this section, complying with requirements of Division-26 sections: Control wiring and signal wiring between field-installed controls, indicating devices, and unit control panels.
- 1.7 Codes and Standards:
- 1.7.1 Electrical Standards: Provide electrical products which have been tested, listed and labeled by UL and comply with NEMA standards.
- 1.7.2 NEMA Compliance: Comply with NEMA standards pertaining to components and devices for electric control systems.
- 1.7.3 NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" where applicable to controls and control sequences.
- 1.7.4 NEC Compliance: Comply with NFPA 70 National Electric Code.
- 1.8 Approval Submittals:
- 1.8.1 Product Data: Submit manufacturer's technical product data for each type of drive furnished, indicating dimensions, capacities, performance characteristics including harmonic contributions, electrical characteristics, finishes of materials, and including installation instructions and start-up instructions.

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- 1.9 Test Reports and Verification Submittals:
- 1.9.1 Submit manufacturer's representative startup report.
- 1.10 O&M Data: Submit maintenance instructions and spare parts lists. Include this data, a copy of approval data in O&M manual.
- 2 PRODUCTS
- 2.1 General: Provide products in sizes and capacities indicated, consisting of variable frequency drives, bypass devices, disconnects, controllers, sensors, transmitters, and other components as required for a complete installation. Except as otherwise indicated, provide manufacturer's standard system components as indicated by published product information, designed and constructed as recommended by manufacturer.
- 2.2 Variable Frequency Drives: Provide UL or ETL approved, variable torque, variable frequency drives capable of being used with AC induction motors without causing overheating or excessive noises. Drives shall be housed in NEMA 1 enclosures. The supplier shall perform all necessary electric power analyses as required to ensure the drives operate properly in the service indicated. Provide the following performance and construction features:
- 2.2.1 The drive may be either voltage or current source, but current source drives must incorporate a voltage clamping circuit. Drives must be able to be tested under no-load conditions.
- 2.2.2 The controller shall accept power as indicated on the drawings and provide a variable frequency output for speed control from 10% to 100% of base speed (1,800 rpm nominal). Provide fused input.
- 2.2.3 The drive shall produce a variable frequency, adjustable voltage output with a constant input power factor of at least 0.95 and a variable-torque constant volts/Hz ratio. The input stage shall use a full wave diode bridge. Provide DC switching power supply.
- 2.2.4 The drive shall maintain an overall efficiency from input to output of at least 95% over the full range of operation.
- 2.2.5 The output stages shall not generate unacceptable line noise, motor noise, or radio frequency interference. Any isolation transformers, filters, or other devices required to prevent these problems, or to enable the drive to function properly with the available utility power shall be provided by the manufacturer.
- 2.2.6 All units shall be warranted for a period of 18 months. All drives shall be pretested before shipment.
- 2.2.7 Drive features:
- 2.2.7.1 Minimum and maximum speed adjustment.
- 2.2.7.2 Separately adjustable acceleration and deceleration.

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- 2.2.7.3 Adjustable current limit.
- 2.2.7.4 Short circuit protection and ground fault protection. Over current protection for driven load shall comply with NEC.
- 2.2.7.5 4-20 mA current follower circuitry.
- 2.2.7.6 Under voltage and over voltage protection.
- 2.2.7.7 Over temperature protection.
- 2.2.7.8 Automatic restarting of the drive after a power outage or power dip.
- 2.2.7.9 Drive status indicator lights and digital display.
- 2.2.7.10 Mode selector switch (manual, off, automatic).
- 2.2.7.11 Manual speed potentiometer.
- 2.2.7.12 Speed indicator and ammeter to indicate full range of operation.
- 2.2.7.13 Motor starter circuit and drive input disconnect switch complying with NEC Article 430.
- 2.2.7.14 Phase loss protection (input and output) and surge suppression.
- 2.2.7.15 Start/stop control in any mode from a remote signal or contact closure.
- 2.2.7.16 Auxiliary contact indicating run status.
- 2.2.7.17 BACnet MS/TP interface.
- 2.2.7.18 Internal diagnostics displayed on unit panel.
- 2.2.7.19 Drives shall be able to catch and drive into a spinning load.
- 2.2.8 Acceptable Manufacturers: Subject to compliance with requirements, provide drives of one of the following:
 - Toshiba
 - Magnetek
 - Asea Brown Boveri
 - Yaskawa
- 3 EXECUTION
- 3.1 Examine areas and conditions under which variable volume systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner

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acceptable to Installer.

- 3.2 Install the variable frequency drives where shown on the drawings in accordance with the manufacturer's printed instructions. If the drive is not located within sight of the motor, provide additional line side disconnect switch complying with the requirements of Division 21 and NEC Article 430.
- 3.3 Mounting: Provide slotted angles or channel bars with mounting hardware for securing drives to the wall. Combustible materials are not permitted.
- 3.4 Refer to Division-26 sections for motor connections and testing requirements.
- 3.5 Variable Volume Pumping Systems:
- 3.5.1 System Adjustment: The drive supplier shall coordinate the setting of all adjustments and setpoints for initial operation. The system and all pumps and control valves shall be monitored for proper operation. It shall be recognized that final settings will be obtained by trial-and-error by necessity. Call backs to achieve proper settings shall be included in the base bid.
- 3.6 Variable Air Volume Systems:
- 3.6.1 Verify that the drives control the air handling unit speeds properly over the full range of operation in response to control signals. Coordinate drive operation with final sheave selection.
- 3.6.2 System Adjustment: The drive supplier shall coordinate the setting of all adjustments and setpoints for initial operation. Monitor system boxes and AHUs for proper operation. It shall be recognized that final settings and locations of static pressure transmitters will be obtained by trial-and-error by necessity. Call backs to achieve proper settings shall be included in the base bid. Coordinate with TAB Contractor to determine minimum fan speed to achieve minimum scheduled supply and outside air flows.
- 3.7 Start-up: Start-up, test, and adjust variable volume systems in conjunction with DDC contractor and manufacturer's authorized representative. Demonstrate compliance with requirements. Replace damaged or malfunctioning equipment.
- 3.8 Owner's Instructions: Provide services of manufacturer's technical representative for one 4-hour day to instruct Owner's personnel in operation and maintenance of variable frequency drives. Schedule instruction with Owner, provide at least 7-day notice to Contractor and Engineer of training date.
- 3.9 System Verification: The manufacturer's authorized representative shall state in writing to the Engineer that the variable volume system is operating properly, final adjustments and calibrations are complete, and Owner training has been accomplished.

END OF SECTION 230913

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SECTION 230923 - DIRECT DIGITAL CONTROLS

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Extent of Energy Management Control and DDC Systems (EMCS/DDC) work required by this section is indicated on drawings and input/output schedules, and by requirements of this section.
- 1.4 Refer to other Division-23 sections for installation of instrument wells, valve bodies and dampers in mechanical systems; not work of this section.
- 1.5 Refer to Division-26 sections for the following work; not work of this section. Power supply wiring for power source to power connection on controls and/or EMCS panels. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.
- 1.6 Provide the following electrical work as work of this section, complying with requirements of Division-26 sections: Control wiring between field-installed controls, equipment, indicating devices, and EMCS/DDC panels.
- 1.7 Codes and Standards:
- 1.7.1 Electrical Standards: Provide electrical products which have been tested, listed and labeled by UL and comply with NEMA standards.
- 1.7.2 NEMA Compliance: Comply with NEMA standards pertaining to components and devices for electric control systems.
- 1.7.3 NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" where applicable to controls and control sequences.
- 1.7.4 Federal Communication Commission (FCC) as required.
- 1.8 Approval Submittals:
- 1.8.1 Product Data: Submit manufacturer's technical product data for each EMCS/DDC panel and control device furnished, indicating dimensions, capacities, performance characteristics, electrical characteristics, finishes of materials. Include installation instructions and start-up instructions. Provide technical specification data for each component and software module.
- 1.8.2 Shop Drawings: Submit shop drawings for the EMCS/DDC containing the following information:

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- 1.8.2.1 Schematic flow diagram of system showing fans, pumps, coils, dampers, valves, and control devices.
- 1.8.2.2 Label each control device with setting or adjustable range of control.
- 1.8.2.3 Indicate all required electrical wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed. The point-to-point wiring diagram shall show all interconnections.
- 1.8.2.4 Provide details of faces of EMCS/DDC panels, including controls instruments and labeling.
- 1.8.2.5 Include written description of sequence of operation.
- 1.8.2.6 Provide a scaled floor plan drawing showing location of all conduit, control cabling, junction boxes, control devices, and surge suppression devices.
- 1.9 Test Reports and Verification Submittals:
 - 1.9.1 Submit system verification letter from manufacturers representative stating that all HVAC controls have been checked, calibrated, started up and verified for proper operation. State that the Owner training has been completed and provide a roster of attendees.
- 1.10 O&M Data Submittals:
 - 1.10.1 Maintenance Data: Submit maintenance instructions and spare parts lists for each type of control device. Include that type data, and a copy of all approval submittals in O&M Manual.
 - 1.10.2 System Manual: In addition to the maintenance data requirements, provide an EMCS/DDC Owner's Manual in a separate binder specifically for this project. This manual shall provide a description of the information flow to and from panels and devices and shall describe the overall communications network. The manual shall also include operating instructions, block diagrams, schematics, schedules, and system descriptions. Instruct Owner's personnel with this manual during the required training periods.
 - 1.10.3 Software: Submit a copy of all software.
 - 1.10.4 Service: Submit name, address, and telephone number of company that will provide service and training for the system.
 - 1.10.5 As-Built Drawings: Provide a scaled floor plan drawing showing location of all conduit, control cabling, junction boxes, control devices, and surge suppression devices.
- 2 PRODUCTS
 - 2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide EMCS/DDC control systems of one of the following:

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Schneider Electric I/A Series

- 2.2 General: Provide EMCS/DDC control products in sizes and capacities indicated, consisting of valves, dampers, sensors, controllers and other components as required for complete installation. Except as otherwise indicated, provide manufacturer's standard control system components as indicated by published product information, designed and constructed as recommended by manufacturer. Provide an EMCS/DDC controls system with the following functional and construction features as indicated. Communications between System Controllers and sub-networks of Custom Application Controllers and/or Application Specific Controllers shall utilize BACnet MSTP (RS485) communications.
- 2.2.1 Each System Controller shall perform communications to a network of Custom Application and Application Specific Controllers using BACnet/MSTP (RS485) as prescribed by the BACnet standard. Each System Controller shall function as a BACnet Router to each unit controller providing a unique BACnet Device ID for all controllers within the system.
- 2.2.2 The Controls Contractor shall provide all communication media, connectors, repeaters and network switches routers necessary for the high speed Ethernet communications network.
- 2.2.3 All values within the system (i.e. schedules, datalogs, points, software variables, custom program variables) shall be readable and controllable (where appropriate) by any System Controller or BACnet Workstation on the communications network via BACnet.
- 2.3 Quality Assurance:
- 2.3.1 Provide equipment of firms regularly engaged in manufacture of EMCS/DDC equipment, of types required, whose products have been in satisfactory use in similar service for not less than three years. Provide evidence that software has been in use satisfactorily for at least one year.
- 2.3.2 Contractor shall have at least three years experience in the installation and servicing of EMCS/DDC equipment similar to that being installed. Contractor shall have an office within 100 miles of the project and shall maintain a remote terminal capable of communication with the EMCS/DDC during the year warranty period.
- 2.4 Control Valves: Provide factory-fabricated pressure independent electric control valves with constant differential pressure across the control valve for 100% valve authority. The valve shall accurately control the flow with an operating pressure differential range of 4 to 60 psi. Provide pressure regulation with EDPM diaphragm, stainless steel spring, and pressure control disc. Pressure control seats shall be brass construction with vulcanized EPDM. The valve shall be adjustable to indicate percentage of valve flow range, utilizing an adjustment collar and lock mechanism. Where type or body material is not indicated, provided selection as determined by manufacturer for installation requirements and pressure class, based on maximum pressure and temperature rating of piping system. Provide valve size in accordance with scheduled or specified maximum pressure drop across control valve. Except as otherwise indicated, provide valves which mate and match material of connecting piping. Equip control valves with control valve motors with proper shutoff ratings for each individual application.

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- 2.4.1 Acceptable Manufacturers: Danfoss, Belimo, Griswold, Bell & Gossett, Flow Design Inc.
- 2.5 Dampers: Refer to Division-23 Section “Ductwork Accessories” for dampers. Actuators are work of this section.
- 2.6 Actuator Motors: Size each motor to operate dampers or valves with sufficient reserve power to provide smooth modulating action or two position action as specified.
- 2.6.1 Provide permanent split-capacitor or shaded pole type motors with gear trains completely oil-immersed and sealed. Equip spring-return motors, where indicated on drawings or in operational sequence, with integral spiral-spring mechanism. Furnish entire mechanism in housing designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
- 2.6.2 Equip motors for outdoor locations and for outside air intakes with “O-ring” gaskets designed to make motors completely weatherproof, and equip with internal heaters to permit normal operation at 10°F.
- 2.6.3 Furnish non-spring return motors for dampers larger than 25 sq. ft. and for valves larger than 2½”. Size for running torque rating of 150 inch-pounds and breakaway torque rating of 300 inch-pounds. Size spring-return motors for running torque rating of 150 inch-pounds and breakaway torque rating of 150 inch-pounds.
- 2.7 EMCS/DDC Associated Components:
- 2.7.1 Provide field-programmable microprocessor-based, stand-alone EMCS/DDC panels as specified herein. The EMCS/DDC panel manufacturer shall be responsible for the complete engineering of the panel. The panel shall be UL listed and housed in a key locked metal cabinet. Parts shall be plug in (modular) for easy repair or expansion. Power input shall be 24V or 120 V. Relays and contacts shall be rated at 24 VA at 24 VAC or 125 VA at 120 and 230 VAC, as required.
1. The System Controller shall have sufficient memory to support its operating system, database, and programming requirements.
 2. The controller shall provide a USB communications port for connection to a PC
 3. The operating system of the Controller shall manage the input and output communications signals to allow distributed controllers to share real and virtual point information and allow central monitoring and alarms.
 4. All System Controllers shall have a real time clock.
 5. Data shall be shared between networked System Controllers.
 6. The System Controller shall continually check the status of its processor and memory circuits. If an abnormal operation is detected, the controller shall:
 - a. Assume a predetermined failure mode.
 - b. Generate an alarm notification.
 - c. Create a retrievable file of the state of all applicable memory locations at the time of the failure.
 - d. Automatically reset the System Controller to return to a normal operating mode.

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7. Environment. Controller hardware shall be suitable for the anticipated ambient conditions. Controller used in conditioned ambient shall be mounted in an enclosure, and shall be rated for operation at -40 F to 122 F.
 8. Clock Synchronization.
 - a. All System Controllers shall be able to synchronize with a NTP server for automatic time synchronization.
 - b. All System Controllers shall be able to accept a BACnet time synchronization command for automatic time synchronization.
 - c. All System Controllers shall automatically adjust for daylight savings time if applicable.
 9. Serviceability
 - a. Provide diagnostic LEDs for power, communications, and processor.
 - b. The System Controller shall have a display on the main board that indicates the current operating mode of the controller.
 - c. All wiring connections shall be made to field removable, modular terminal connectors.
 - d. The System controller shall utilize standard DIN mounting methods for installation and replacement.
 10. Memory. The System Controller shall maintain all BIOS and programming information indefinitely without power to the System controller
 11. Immunity to power and noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shut-down below 80% nominal voltage
 12. BACnet Test Labs (BTL) Listing. Each System Controller shall be listed as a Building Controller (B-BC) by the BACnet Test Labs.
- 2.8 EMCS/DDC Functions: Furnish the following applications software for building and energy management. All software applications shall reside and run in the system controllers. Editing of applications shall occur at the operator interface.
1. Scheduling. Provide the capability to schedule each object or group of objects in the system. Each of these schedules shall include the capability for start, stop, optimal start, optimal stop, and night economizer actions. Each schedule may consist of up to [10] events. When a group of objects are scheduled together, provide the capability to define advances and delays for each member. Each schedule shall consist of the following:
 - a. Weekly Schedule. Provide separate schedules for each day of the week.
 - b. Exception Schedules. Provide the ability for the operator to designate any day of the year as an exception schedule. This exception schedule shall override the standard schedule for that day. Exception schedules may be defined up to a year in advance. Once an exception schedule is executed it will be discarded and replaced by the standard schedule for that day of the week.
 - c. Holiday Schedules. Provide the capability for the operator to define up to 99 special or holiday schedules. These schedules may be placed on the scheduling calendar and will be repeated each year. The operator shall be able to define the length of each holiday period.
 - d. Optimal Start. The scheduling application outlined above shall support an optimal start algorithm. This shall calculate the thermal characteristics of a zone and start the equipment prior to occupancy to achieve the desired space temperature at the specified occupancy time. The algorithm shall calculate separate sets of heating and

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- cooling rates for zones that have been unoccupied for less than and greater than 24 hours. Provide the ability to modify the start algorithm based on outdoor air temperature. Provide an early start limit in minutes to prevent the system from starting before an operator determined time limit.
2. Trend Log Application
 - a. Trend log data shall be sampled and stored on the System Controller panel and shall be capable of being archived to a BACnet Workstation for longer term storage.
 - 1) Trend logs shall include interval, start-time, and stop-time.
 - 2) Trend log intervals shall be configurable as frequently as 1 minute and as infrequently as 1 year.
 - b. Automated Trend Logs.
 - 1) The system controller shall automatically create trend logs for defined key measurements for each controlled HVAC device and HVAC application.
 - 2) The automatic trend logs shall monitor these parameters for a minimum of 7 days at 15 minute intervals. The automatic trend logs shall be user adjustable.
 3. Alarm/Event Log
 - a. Any object in the system shall be configurable to generate an alarm when transitioning in and out of a normal or fault state.
 - b. Any object in the system shall allow the alarm limits, warning limits, states, and reactions to be configured for each object in the system.
 - c. An alarm/event shall be capable of triggering any of the following actions:
 - 1) Route the alarm/event to one or more alarm log. The alarm message shall include the name of the alarm location, the device that generated the alarm, and the alarm message itself.
 - 2) Route an e-mail message to an operator(s)
 - 3) Log a data point(s) for a period of time
 - 4) Run a custom control program
 4. VAV System Coordination. Provide applications software to properly coordinate and control the VAV system to ensure equipment safety and minimize energy use. This application shall perform the following functions:
 - a. Startup and shutdown the air handler safely. Ensure the VAV boxes are open sufficiently when the air handler is running, to prevent damage to the ductwork and VAV boxes due to high air pressure.
 - b. Calibrate VAV boxes.
 - c. Fan Pressure Optimization (ASHRAE 90.1) - Minimize energy usage by controlling system static pressure to the lowest level while maintaining zone airflow requirements. System static pressure controlled to keep the “most open” zone damper between 65% and 75% open.
 - 1) The Fan Pressure Optimization application shall have the ability to identify and display the discharge air setpoint of the air-handler and the VAV box that serves the critical zone (e.g., the zone with the most open VAV box damper). This information shall dynamically update with changes in the location of the critical zone.
 - 2) During commissioning, and with the engineer/owner, the controls contractor shall confirm the performance of Fan Pressure Optimization by conducting a field functional test that demonstrates critical zone reset.
 5. Point Control. User shall have the option to set the update interval, minimum on/off time, event notification, custom programming on change of events.

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6. Timed Override. A standard application shall be utilized to enable/disable temperature control when a user selects on/cancel at the zone sensor, operator interface, or the local operator display. The amount of time that the override takes precedence will be selectable from the operator interface.
7. Anti-Short Cycling. All binary output points shall be protected from short cycling

2.9 Operator Interface:

1. Operator Interface
 - a. The operator interface shall be accessible via a web browser.
 - b. The operator interface shall support the following Internet web browsers:
 - 1) Internet Explorer 8.0+
 - c. The operator interface shall support the following mobile web browsers:
 - 1) iOS (iPad/iPhone) V4.0+
 - 2) Android (Phone) V2.3+
2. Mobile App Operator Interface
 - a. Mobile App Operator Interface shall support the following Operating systems
 - 1) Apple iOS 5
 - 2) Apple iOS 6
 - 3) Android V2.3
 - 4) Android V4.0
 - 5) Android V4.1
 - b. The operator interface shall support system access on a mobile device via a mobile app to:
 - 1) Alarm log
 - 2) System Status
 - 3) Equipment status
 - 4) Space Status
 - 5) Standard Equipment graphics
 - c. The operator interface shall support actions on a mobile device via a mobile app to:
 - 1) Override set points
 - 2) Override occupancy
 - 3) Acknowledge Alarms
 - 4) Comment on Alarms
 - d. System Security
 - 1) Each operator shall be required to login to the system with a user name and password in order to view, edit, add, or delete data.
 - 2) User Profiles shall restrict the user to only the objects, applications, and system functions as assigned by the system administrator.
 - 3) Each operator shall be allowed to change their user password
 - 4) The System Administrator shall be able to manage the security for all other users
 - 5) The system shall include pre-defined "roles" that allow a system administrator to quickly assign permissions to a user.
 - 6) User logon/logoff attempts shall be recorded.
 - 7) The system shall protect itself from unauthorized use by automatically logging off following the last keystroke. The delay time shall be user definable.
 - 8) All system security data shall be stored in an encrypted format.
 - e. Database

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- 1) Database Save. A system operator with the proper password clearance shall be able to archive the database on the designated operator interface PC.
 - 2) Database Restore. The system operator shall also be able to clear a panel database and manually initiate a download of a specified database to any panel in the system.
- f. On-Line Help and Training
- 1) Provide a context sensitive, on line help system to assist the operator in operation and configuration of the system.
 - 2) On-line help shall be available for all system functions and shall provide the relevant data for each particular screen.
- g. System Diagnostics
- 1) The system shall automatically monitor the operation of all network connections, building management panels, and controllers.
 - 2) The failure of any device shall be annunciated to the operators.
- h. Equipment & Application Pages
- 1) The operator interface shall include standard pages for all equipment and applications. These pages shall allow an operator to obtain information relevant to the operation of the equipment and/or application, including:
 - a) Animated Equipment Graphics for each major piece of equipment and floor plan in the System. This includes:
 - (1) Each Chiller, Air Handler, VAV Terminal, Fan Coil, Boiler, and Cooling Tower. These graphics shall show all points dynamically as specified in the points list.
 - (2) Animation capabilities shall include the ability to show a sequence of images reflecting the position of analog outputs, such as valve or damper positions. Graphics shall be capable of launching other web pages.
 - b) Alarms relevant to the equipment or application without requiring a user to navigate to an alarm page and perform a filter.
 - c) Historical Data (As defined in Automatic Trend Log section below) for the equipment or application without requiring a user to navigate to a data log page and perform a filter.
- i. System Graphics. Operator interface shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract. Indicate thermal comfort on floor plan summary graphics using colors to represent zone temperature relative to zone set point.
- 1) Functionality. Graphics shall allow operator to monitor system status, to view a summary of the most important data for each controlled zone or piece of equipment, to use point and-click navigation between zones or equipment, and to edit set points and other specified parameters.
 - 2) Graphic imagery – graphics shall use 3D images for all standard and custom graphics. The only allowable exceptions will be photo images, maps, schematic drawings, and selected floor plans.
 - 3) Animation. Graphics shall be able to animate by displaying different Image lies for changed object status.
 - 4) Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator.

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- 5) Format. Graphics shall be saved in an industry-standard format such as BMP, JPEG, PNG, or GIF. Web-based system graphics shall be viewable on browsers compatible with World Wide Web Consortium browser standards. Web graphic format shall require no plug-in (such as HTML and JavaScript) or shall only require widely available no-cost plug-ins (such as Active-X and Macromedia Flash).
- j. Custom Graphics
 - 1) The operator interface shall be capable of displaying custom graphics in order to convey the status of the facility to its operators.
 - 2) Graphical Navigation. The operator interface shall provide dynamic color graphics of building areas, systems and equipment.
 - 3) Graphical Data Visualization. The operator interface shall support dynamic points including analog and binary values, dynamic text, static text, and animation files.
 - 4) Custom background images. Custom background images shall be created with the use of commonly available graphics packages such as Adobe Photoshop. The graphics generation package shall create and modify graphics that are saved in industry standard formats such as GIF and JPEG.
- k. Graphics Library. Furnish a library of standard HVAC equipment such as chillers, air handlers, terminals, fan coils, unit ventilators, rooftop units, and VAV boxes, in 3-dimensional graphic depictions. The library shall be furnished in a file format compatible with the graphics generation package program.
- l. Manual Control and Override.
 - 1) Point Control. Provide a method for a user to view, override, and edit if applicable, the status of any object and property in the system. The point status shall be available by menu, on graphics or through custom programs.
 - 2) Temporary Overrides. The user shall be able to perform a temporary override wherever an override is allowed, automatically removing the override after a specified period of time.
 - 3) Override Owners. The system shall convey to the user the owner of each override for all priorities that an override exists.
 - 4) Provide a specific icon to show timed override or operator override, when a point, unit controller or application has been overridden manually.
- m. Engineering Units
 - 1) Allow for selection of the desired engineering units (i.e. Inch pound or SI) in the system.
 - 2) Unit selection shall be able to be customized by locality to select the desired units for each measurement.
 - 3) Engineering units on this project shall be IP.
3. Scheduling. A user shall be able to perform the following tasks utilizing the operator interface:
 - a. Create a new schedule, defining the default values, events and membership.
 - b. Create exceptions to a schedule for any given day.
 - c. Apply an exception that spans a single day or multiple days.
 - d. View a schedule by day, week and month.
 - e. Exception schedules and holidays shall be shown clearly on the calendar.
 - f. Modify the schedule events, members and exceptions.
4. Trend Logs
 - a. Trend Logs Definition.

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- 1) The operator interface shall allow a user with the appropriate security permissions to define a trend log for any data in the system.
- 2) The operator interface shall allow a user to define any trend log options as described in the Application and Control Software section.
- b. Trend Log Viewer.
 - 1) The operator interface shall allow Trend Log data to be viewed and printed.
 - 2) The operator interface shall allow a user to view trend log data in text-based (time –stamp/value).
 - 3) The operator shall be able to view the data collected by a trend log in a graphical chart in the operator interface.
 - 4) Trend log viewing capabilities shall include the ability to show a minimum of 5 points on a chart.
 - 5) Each data point trend line shall be displayed as a unique color.
 - 6) The operator shall be able to specify the duration of historical data to view by scrolling and zooming.
 - 7) The system shall provide a graphical trace display of the associated time stamp and value for any selected point along the x-axis.
- c. Export Trend Logs.
 - 1) The operator interface shall allow a user to export trend log data in CSV or PDF format for use by other industry standard word processing and spreadsheet packages.
5. Alarm/Event Notification
 - a. An operator shall be notified of new alarms/events as they occur while navigating through any part of the system via an alarm icon.
 - b. Alarm/Event Log. The operator shall be able to view all logged system alarms/events from any operator interface.
 - 1) The operator shall be able to sort and filter alarms from events. Alarms shall be sorted in a minimum of 4 categories based on severity.
 - 2) Alarm/event messages shall use full language, easily recognized descriptors.
 - 3) An operator with the proper security level may acknowledge and clear alarms/events.
 - 4) All alarms/events that have not been cleared by the operator shall be stored by the building controller.
 - 5) The alarm/event log shall include a comment field for each alarm/event that allows a user to add specific comments associated with any alarm.
 - c. Alarm Processing.
 - 1) The operator shall be able to configure any object in the system to generate an alarm when transitioning in and out of a normal state.
 - 2) The operator shall be able to configure the alarm limits, warning limits, states, and reactions for each object in the system.
6. Reports and Logs.
 - a. The operator interface shall provide a reporting package that allows the operator to select reports.
 - b. The operator interface shall provide the ability to schedule reports to run at specified intervals of time.
 - c. The operator interface shall allow a user to export reports and logs from the building controller in a format that is readily accessible by other standard software applications including spreadsheets and word processing. Acceptable formats include:

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- 1) CSV, HTML, XML, PDF
- d. Reports and logs shall be readily printed to the system printer.
- e. Provide a means to list and access the last 10 reports viewed by the user.
- f. The following standard reports shall be available without requiring a user to manually configure the report:
 - 1) All Points in Alarm Report: Provide an on demand report showing all current alarms.
 - 2) All Points in Override Report: Provide an on demand report showing all overrides in effect.
 - 3) Commissioning Report: Provide a one-time report that lists all equipment with the unit configuration and present operation.
 - 4) Points report: Provide a report that lists the current value of all points
7. VAV Air System. An operator shall be able to view and control (where applicable) the following parameters via the operator interface:
 - a. System Mode
 - b. System Occupancy
 - c. Ventilation (Outdoor air flow) setpoint
 - d. Ventilation (Outdoor air flow) status
 - e. Air Handler Static pressure setpoint
 - f. Air Handler Static pressure status
 - g. Air Handler occupancy status
 - h. Air Handler Supply air cooling and heating set points
 - i. Air Handler minimum, maximum and nominal static pressure setpoints
 - j. VAV box minimum and maximum flow
 - k. VAV box drive open and close overrides
 - l. VAV box occupancy status
 - m. VAV box Airflow to space
 - n. Average space temperature
 - o. Minimum space temperature
 - p. Maximum space temperature
8. Chilled Water System. An operator shall be able to view and control (where applicable) the following parameters via the operator interface:
 - a. System mode of the chiller plant
 - b. Chiller enable/disable status
 - c. System supply water setpoint
 - d. System supply and return water temperature
 - e. System Chilled water pump status
 - f. System Chilled water flow
 - g. Bypass pipe flow rate (if applicable)
 - h. Chiller or system failure information
9. Custom Application Programming. Provide the tools to create, modify, and debug custom application programming. The operator shall be able to create, edit, and download custom programs at the same time that all other system applications are operating. The system shall be fully operable while custom routines are edited, compiled, and downloaded.
10. Custom Graphic Editor. Provide the tools to create, modify, and debug custom graphics. The operator shall be able to create, edit, and download custom graphics at the same time that all other system applications are operating. The system shall be fully operable while custom graphics are edited, compiled, and downloaded.

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- 2.10 Associated Hardware: Provide actuators, relays, and other interface devices as required to execute the indicated control functions.
- 2.11 EMCS/DDC Input Devices:
- 2.11.1 Temperature Sensors: Provide nickel resistance temperature detector (RTD) type sensors for duct, well or room mounting as required by duty indicated. Accuracy: plus or minus 0.5°F.
- 2.11.2 Temperature Transmitters: Provide 3 or 4 wire resistance temperature detector (RTD) type transmitters for duct, well or room mounting as required by duty indicated. Provide metal enclosure sealed against moisture. Accuracy: plus or minus 0.25°F. Install wells to accommodate sensors. Wells must be of sufficient size to allow insertion of an electronic probe with the sensor for calibration. Accutech AI-1000 or approved equal.
- 2.11.3 Current Transformers: Provide current transformers (and potential transformers if required) and all associated interface equipment for sensing kW demand.
- 2.11.4 Hydronic Differential Pressure Transmitter: Provide self-contained, variable capacitance type differential pressure transmitters with the following features. Subject to compliance with requirements, provide transmitters of one of the following: Rosemont, Foxboro, Leslie, Yokagawa.
- a. Sealed electronics compartment, suitable for duty at 90°F, 100% RH. Provide NEMA 4 enclosure.
 - b. Output 4-20 ma DC, isolated linear signal.
 - c. Design pressure: 2000 psi, design overrange differential: 2000 psi with minimal adverse affect on output.
 - d. Accuracy: plus or minus 0.25% of span.
 - e. Stability: plus or minus 0.25% of range limit.
 - f. Provide zero and span adjustments. Set span for each transmitter based on duty, not at maximum unless required.
- 2.11.5 Differential and Static Pressure Sensors (Air): Provide 0-6" w.g. adjustable in 2" w.g. span pressure sensors with $\pm 0.5\%$ full scale accuracy. Provide zero and span adjustments. Provide over-pressure protection to 10 psig positive or negative.
- 2.11.6 Differential Pressure Switches (Air): Provide 0.05 to 5" w.g. differential pressure switches with adjustable setpoint and SPDT contact rated for duty indicated. Provide over-pressure protection to 1 psig positive or negative.
- 2.11.7 Insertion Type Flowmeters: Provide electromagnetic insertion type flowmeters suitable for measuring electrically conductive liquids at a flow range velocity of 0.1 ft/s to 20 ft/s. Provide $\pm 1.0\%$ accuracy of reading between 2 and 20 ft/second flow velocity. No greater than 0.1 psi pressure drop at 12 ft/s flow velocity. Onicon F-3500 or equal.
- 2.11.8 Airflow Measuring Stations: Provide airflow measuring station consisting of multiple hermetically sealed bead in glass thermistor probes capable of reading airflow with an

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accuracy of $\pm 2\%$ of reading. Ebron GTx116-p+ or engineer approved equal.

2.11.9 Humidity Sensors: Relative-humidity sensing element shall use non-saturating sensing elements capable of withstanding a saturated condition without permanently affecting calibration or sustaining damage. Sensing elements shall have an accuracy of plus or minus 5 percent of full scale within the range of 20 to 80 percent relative humidity. A 2-wire, loop-powered transmitter located at the sensing elements shall be provided to convert the sensing elements output to a linear 4-to-20 mA_{dc} output corresponding to the required humidity measurement. The transmitter shall be a 2-wire, loop-powered device. The output error shall not exceed 0.1 percent of calibrated measurement. The transmitter shall include offset and span adjustments.

2.12 Guarantee:

2.12.1 All components, parts, and assemblies shall be guaranteed against defects in material and workmanship for a period of one year after acceptance. Expressed warranties are conditionally based on the requirement that the items covered within the guarantee are used and maintained in accordance with the manufacturer's recommendations. Guarantee commences at time of acceptance and continues for one year. Acceptance shall not occur until the Owner's operators are able to use the EMCS/DDC and receive reliable information from inputs and outputs.

2.12.2 The first year guarantee shall, as part of the base bid for the EMCS/DDC, include full service and maintenance of the EMCS/DDC. This service and maintenance shall include all necessary repair, reprogramming, calibration, cleaning, minimum (4) quarterly inspections, call back service, etc. This first year service, maintenance and guarantee shall be included in the base bid of the EMCS/DDC.

3 EXECUTION

3.1 Examine areas and conditions under which EMCS/DDC work is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.

3.2 Installation of EMCS/DDC:

3.2.1 General: Install systems and materials in accordance with manufacturer's instructions, shop drawings, and details on drawings. Install electrical components and use electrical products complying with requirements of applicable Division-26 sections of these specifications. Mount panels at convenient locations and heights.

3.2.2 Control Wiring: The term "control wiring" is defined to include wire, conduit and miscellaneous materials as required for mounting and connecting electric control devices. Install all control wiring in conduit. All low voltage control wiring shall be installed in conduit.

3.2.3 Wiring System: Install complete control wiring system for the EMCS/DDC. Conceal wiring, except in mechanical rooms and areas where other conduit and piping are exposed. Provide multi-conductor instrument harness (bundle) in place of single conductors where number of

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conductors can be run along common path. Fasten flexible conductors bridging cabinets and doors, neatly along hinge side, and protect against abrasion. Tie and support conductors neatly.

3.2.4 Install control wiring in accordance with the National Electric Code and Division 26 requirements.

3.2.5 Number-code or color-code conductors, excluding those used for local individual room controls, appropriately for future identification and servicing of control system. Tag all sensor wiring to identify zone number and room number where sensor is located.

3.2.6 Label all sensors, valves, dampers, safety devices and controllers with engraved tags matching the shop drawings.

3.3 Programming of EMCS/DDC:

3.3.1 The Contractor shall obtain operational schedules for the controlled equipment from the Engineer. Submittal data relevant to operational schedules shall be forwarded from the Contractor to the Engineer. Upon receipt of approval, the Contractor shall proceed with installation, setup, calibration and check out of the various control and monitoring systems.

Having completed component and system installation, the Contractor shall submit a written request to the Engineer to inspect and approve their satisfactory operation.

3.3.2 The EMCS/DDC shall perform all functions on the equipment as describes in Division-23 section "HVAC Sequence of Operation and as called for in the input/output schedule on the drawings. This, in conjunction with the drawings, defines the scope and extent of the project with regard to the required number of panels, control point relays, and devices. Field verify voltages at point-of-interface and provide relays as required.

3.3.3 Channel numbers may be reassigned by the Contractor during shop drawing submittal.

3.3.4 Model numbers, horsepower, voltages, and other information equipment where listed on the drawings are for Contractor's convenience. Verify all information in the field as necessary for preparation of shop drawings.

3.4 Functional Requirements of EMCS/DDC:

3.4.1 Provide all necessary relays, sensors, wiring and contacts to achieve proper operation.

3.4.2 Connect EMCS/DDC panels to remote panels where shown.

3.4.3 Coordinate EMCS/DDC work with pneumatic control work. Provide compatible equipment.

3.5 Adjusting and Cleaning:

3.5.1 Startup: Startup, test, and adjust the EMCS/DDC in presence of manufacturer's authorized representative. Demonstrate compliance with requirements. Replace damaged or

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malfunctioning controls and equipment.

- 3.5.2 Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.
- 3.5.3 Final Adjustment: After completion of installation, adjust the program, relays, interface devices, and similar equipment provided as work of this section for optimum operation.
- 3.6 VFD System Adjustment: The drive/controller supplier shall set all adjustments and setpoints for initial operation. The hydronic system and all pumps and control valves shall be monitored for proper operation. The ductwork and all fans and terminal units shall be monitored for proper operation. It shall be recognized that final settings will be obtained by trial-and-error by necessity. Call backs to achieve proper settings shall be included in the base bid.
- 3.7 Owner's Instructions:
- 3.7.1 During system startup and at such time acceptable performance of the EMCS/DDC hardware and software has been established, the Contractor shall provide on-site operator instruction. This instruction shall be performed during normal working hours and shall be conducted by a competent representative of the Contractor familiar with the system's software, hardware and accessories. The Contractor shall maintain a roster of all attendees at all training sessions.
- 3.7.2 At a time mutually agreed upon during system training as stated above, the Contractor shall give up to 40 hours (as needed) of instruction to the Owner's designated personnel on the operation of all equipment within the EMCS/DDC and describe its intended use with respect to the programmed functions specified.
- 3.7.3 Operator orientation of the EMCS/DDC shall include, but not be limited to, the overall operational program, equipment functions both individually and as part of the total integrated system, commands, advisories, and appropriate operator intervention required in responding to the EMCS/DDC operation.
- 3.7.4 Provide at least 14-day notice to Owner and Engineer of training dates.
- 3.8 System Verification: The manufacturer's authorized representative shall state in writing to the Engineer that the EMCS/DDC system is operating properly, final adjustments and calibrations are complete, and Owner training has been accomplished.

END OF SECTION 230923

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SECTION 233113 - HVAC METAL DUCTWORK**1 GENERAL**

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.
- 1.3 Extent of HVAC metal ductwork is indicated on drawings and in schedules, and by requirements of this section.
- 1.4 Refer to other Division-23 sections for exterior insulation of metal ductwork.
- 1.5 Refer to other Division-23 sections for ductwork accessories.
- 1.6 Codes and Standards:
- 1.6.1 SMACNA Standards: Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" 1985 Edition for fabrication and installation of metal ductwork, unless otherwise noted.
- 1.6.2 NFPA 90A Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".
- 1.6.3 NFPA 96 Compliance: Comply with NFPA 96 "Standard for Installation of Equipment for Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment".
- 1.7 Approval Submittals:
- 1.7.1 Product Data: Submit manufacturer's technical product data and installation instructions for the following.
- Factory-fabricated ductwork
Sealants
Adhesive
Spin-in fittings
Side take-off fittings
- 1.7.2 Shop Drawings: Submit scaled layout drawings of HVAC metal ductwork and fittings including, but not limited to, duct sizes, locations, elevations, and slopes of horizontal runs, wall and floor penetrations, and connections. Show interface and spatial relationship between ductwork and proximate equipment. Show modifications of indicated requirements, made to conform to local shop practice, and how those modifications ensure that free area, materials, and rigidity are not reduced.

2 PRODUCTS

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2.1 Ductwork Materials:

2.1.1 Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, stains and discolorations, and other imperfections, including those which would impair painting.

2.1.2 Galvanized Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lockforming quality; with G 90 zinc coating in accordance with ASTM A 525; and mill phosphatized for exposed locations. Stamp gauge and manufacturer's identification on each sheet. Break sheets so that identification is exposed.

2.1.3 Stainless Steel Sheet: Where indicated, provide 18-gauge stainless steel complying with ASTM A 167; Type 316; with No. 4 finish where exposed to view in occupied spaces. Provide No. 1 finish elsewhere. Protect finished surfaces with mill-applied adhesive protective paper, maintained through fabrication and installation.

2.2 Miscellaneous Ductwork Materials:

2.2.1 General: Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.

2.2.2 Duct Sealant: Provide non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.

2.2.3 Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork. For exposed stainless steel ductwork, provide matching stainless steel support materials.

2.2.4 Spin-in and Side Take-off Fittings: Provide round branch run-outs as follows.

2.2.4.1 Spin in air device connections shall be straight sided spin in with damper and two inch high insulation stand-off equal to Crown 3720-DS.

2.2.4.2 Where duct height does not permit the use of spin-in fittings, use low profile side take-off fittings equal to Crown 3300-DS or Flexmaster STOD-BO.

2.2.5 Fittings: Provide radius type fittings fabricated of multiple sections with maximum 15° change of direction per section. Unless specifically detailed otherwise, use 45° laterals and 45° elbows for branch takeoff connections. Where 90° branches are indicated, provide conical type tees.

2.3 Fabrication:

2.3.1 Shop fabricate ductwork in 4, 8, 10 or 12-ft lengths, unless otherwise indicated or required to complete runs. Preassemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling.

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Match-mark sections for reassembly and coordinated installation.

- 2.3.2 Shop fabricate ductwork of gauges and reinforcement complying with SMACNA "HVAC Duct Construction Standards", except provide sealant at all joints. Supply duct between AHU discharge and terminal units shall be minimum 4" pressure class. Duct downstream of terminal units, supply duct from low pressure air conditioning units, and all return and exhaust duct shall be minimum 2" pressure class unless otherwise noted.
- 2.3.3 Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to 1½ times associated duct width; and fabricate to include turning vanes in elbows where shorter radius is necessary. Limit angular tapers to 30° for contracting tapers and 20° for expanding tapers.
- 2.3.4 Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division-23 section "Ductwork Accessories" for accessory requirements.
- 2.4 Factory-Fabricated Low Pressure Ductwork (Maximum 2" W.G.):
- 2.4.1 Material: Galvanized sheet steel complying with ASTM A 527, lockforming quality, with ASTM A 525, G90 zinc coating, mill phosphatized.
- 2.4.2 Gauge: 28-gauge minimum for round ducts and fittings, 4" through 8" diameter. 26-gauge minimum 9" through 14", 24-gauge minimum 15" through 26".
- 2.4.3 Elbows: One piece construction for 90° and 45° elbows 14" and smaller. Provide multiple gore construction for larger diameters with standing seam circumferential joint.
- 2.4.4 Divided Flow Fittings: 90° tees, constructed with saddle tap spot welded and bonded to duct fitting body.
- 2.4.5 Acceptable Manufacturers: Subject to compliance with requirements, provide factory-fabricated ductwork by Semco Mfg., Inc. or United Sheet Metal Div., United McGill Corp, or approved equal.

3 EXECUTION

- 3.1 General: Examine areas and conditions under which HVAC metal ductwork is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
- 3.2 Installation of Metal Ductwork:
- 3.2.1 General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air-tight (5% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at

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connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor.

- 3.2.2 Supports: Install concrete inserts for support of ductwork in coordination with formwork, as required to avoid delays in work. Install self-drilling screw anchors in prestressed concrete or existing work.
- 3.2.3 Field Fabrication: Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate installation requirements. Seal joints in round or oval ductwork with hard cast or shrink bands, and sheet metal screws, or by welding. High velocity rectangular ducts shall have approved joints and be made airtight with sealer or welding.
- 3.2.4 Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally. Avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct useable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. In finished and occupied spaces, conceal ductwork from view by locating in mechanical shafts, hollow wall construction or above suspended ceilings, unless specifically noted as "Exposed". Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.
- 3.2.5 Electrical Equipment Spaces: Do not route ductwork through transformer vaults or other electrical equipment spaces and enclosures.
- 3.2.6 Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gauge as duct. Overlap opening on 4 sides by at least 1 1/2". Fasten to duct and substrate. Where ducts pass through fire-rated floors, walls, or partitions, provide firestopping between duct and substrate.
- 3.2.7 Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.
- 3.2.8 Installation: Install metal ductwork in accordance with SMACNA HVAC Duct Construction Standards. Fan discharge outlet ducts shall be installed correctly with regard to "system effect" per AMCA Publication 201.
- 3.3 Leakage Tests: After each duct system is completed, test for duct leakage in accordance with Sections 3 and 5 of the SMACNA HVAC Air Duct Leakage Test Manual. Test pressure shall be equal to pressure class of duct, less 0.5" static pressure. Repair leaks and repeat tests until total leakage is less than 5% of system design air flow for low pressure systems and less than 1% for systems rated over 3".

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- 3.4 Equipment Connections: Connect metal ductwork to equipment as indicated, provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery. Provide access doors as indicated.
- 3.5 Clean ductwork internally free of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration. Keep ducts closed with poly during construction to prevent contamination by construction dust and debris.

END OF SECTION 233113

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SECTION 233300 - DUCTWORK ACCESSORIES

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of ductwork accessories work is indicated on drawings and in schedules, and by requirements of this section.

1.4 Refer to other Division-23 sections for testing, adjusting, and balancing of ductwork accessories; not work of this section.

1.5 Codes and Standards:

1.5.1 SMACNA Compliance: Comply with applicable portions of both SMACNA "HVAC Duct Construction Standards, Metal and Flexible" and "Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems".

1.5.2 UL Compliance: Construct, test, and label fire dampers in accordance with UL Standard 555 "Fire Dampers and Ceiling Dampers". Construct, test and label smoke dampers in accordance with UL Standard 555S "Leakage Rated Dampers for use in Smoke Control Systems" .

1.5.3 NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems" pertaining to installation of ductwork accessories.

1.6 Approval Submittals:

1.6.1 Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction; and installation instructions as follows:

Low pressure manual dampers
Control dampers
Fire dampers
Duct access doors
Flexible connections

1.6.2 O&M Data Submittals: Submit manufacturer's maintenance data including parts lists for fire dampers, smoke dampers. Include this data, product data, and a copy of approval submittals in O&M manual.

2 PRODUCTS

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2.1 Dampers:

- 2.1.1 Low Pressure Manual Dampers: Provide 16 gauge dampers of single-blade type (12" maximum blade width) or multiblade type. Damper blades to be gang-operated from a single shaft with nylon or ball bearings on each end. Provide indexed locking quadrant. Parallel or opposed blade style is acceptable. Provide 2" standoff on locking quadrant for externally insulated duct.
- 2.1.2 Control Dampers: Extruded aluminum (6063-T5) damper frame shall not be less than 0.080" in thickness. Damper frame shall be 4" deep x 1", with duct mounting flanges on both sides of frame. Damper frame shall have a 2" mounting flange on the rear of the damper when installed as Extended Rear Flange install type. Aluminum frame shall be clear anodized to a minimum thickness of 0.7 mil deep. Frame shall be assembled using stainless steel screws. Welded frames shall not be acceptable. Actuators (motors) are provided by control contractor.
- 2.1.2.1 Blades shall be maximum 6.4" deep extruded aluminum (6063-T5) air-foil profiles with a minimum wall thickness of 0.06", clear anodized to a minimum thickness of 0.7 mil deep.
- 2.1.2.2 Blade seals shall be extruded silicone, secured in an integral slot within the aluminum blade extrusions and shall be mechanically fastened to prevent shrinkage and movement over the life of the damper. Adhesive or clip-on type blade seals will not be approved.
- 2.1.2.3 Hexagonal control shaft shall be $\frac{7}{16}$ ". It shall have an adjustable length and shall be an integral part of the blade axle. A field-applied control shaft shall not be acceptable. All parts shall be stainless steel.
- 2.1.2.4 Linkage hardware shall be aluminum and stainless steel, installed in the frame side, out of the airstream, and accessible after installation. Linkage hardware shall be complete with stainless steel cup-point trunnion screws to prevent linkage slippage. Linkage that consists of metal rubbing metal will not be approved.
- 2.1.2.5 Dampers shall be designed for operation in temperatures ranging from -40°F to 212°F.
- 2.1.2.6 Dampers shall be AMCA rated for Leakage Class 1A at 1 in w.g. static pressure differential. Standard air leakage data to be certified under the AMCA Certified Ratings Program.
- 2.1.2.7 Dampers shall be custom made to required size, with blade stops not exceeding 1¼" in height.
- 2.1.2.8 Dampers shall be opposed blade for modulating dampers or parallel blade action for open/shut dampers.
- 2.1.2.9 Dampers shall be installed in the following manner: Installed in Duct
- 2.1.2.10 Installation of dampers must be in accordance with manufacturer's current installation guidelines, provided with each damper shipment.
- 2.1.2.11 Field supplied intermediate structural support is required to resist applied pressure loads for dampers that consist of two or more sections in both height and width.

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- 2.1.2.12 Acceptable Manufacturers: Subject to compliance with requirements, provide access doors by TAMCO (T.A. Morrison & Co, Inc), Ruskin TED50CD, Greenheck VCD33, or approved equal.
- 2.2 Fire and Smoke Dampers:
- 2.2.1 Fire Dampers: Provide curtain type fire dampers, UL classified and labeled per UL 555, of types and sizes indicated. Construct casings and blades of galvanized steel. Damper shall not restrict duct free area when open. Dampers shall be rated for dynamic closure under flow and pressure. Provide sleeves and mounting angles. Provide fusible link rated at 160 to 165° F unless otherwise indicated. Provide damper with positive lock in closed position. All dampers shall be spring activated. Basis of design:
- 1-1/2 HR: Ruskin IBD2 - Style B for rectangular, Style CR for round, Style CO for oval.
- 1-1/2 HR: Ruskin IBDT for transfer grilles in narrow partitions.
- 3 HR: Ruskin IBD23 - Style B for rectangular, Style CR for round, Style CO for oval.
- 2.2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide fire and dampers by Air Balance, Inc., American Warning & Ventilating, Arrow Louver and Damper, Penn Ventilator Co., or Ruskin Mfg. Co.
- 2.3 Turning Vanes: Provide manufactured or fabricated single wall turning vanes and vane runners, constructed in accordance with SMACNA "HVAC Duct Construction Standards".
- 2.4 Duct Access Doors:
- 2.4.1 General: Provide duct access doors of size indicated, or as required for duty indicated.
- 2.4.2 Construction: Construct of same or greater gauge as ductwork served. Provide insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct. Provide one side hinged, other side with one handle-type latch for doors 12" high and smaller, 2 handle-type latches for larger doors.
- 2.4.3 Acceptable Manufacturers: Subject to compliance with requirements, provide access doors by Air Balance, Inc., Duro Dyne Corp., Ruskin Mfg. Co., or Ventfabrics, Inc.
- 2.5 Flexible Connections:
- 2.5.1 General: Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.
- 2.5.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products by one

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of the following: Duro Dyne Corp., Flexaust (The) Co., or Ventfabrics, Inc.

3 EXECUTION

3.1 Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Installation of Ductwork Accessories:

3.2.1 Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

3.2.2 Install balancing dampers at all main ducts adjacent to units in return air, outside air and where indicated.

3.2.3 Install control dampers in the outside air duct and return air duct for each air handler. Damper operator provided by control contractor.

3.2.4 Install turning vanes in square or rectangular 90° elbows in supply, return, and exhaust air systems, and elsewhere as indicated.

3.2.5 Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter. Install on entering air side of reheat coils.

3.2.6 Install flexible connections in ductwork such that the clear length of the connector is approximately two inches. Provide thrust restraints as required. Flexible material shall not be so slack as to take a definite concave or convex shape during fan operation.

3.2.7 Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.2.1 Install fire dampers within fire walls and floors at locations shown on the mechanical drawings. Install in strict accordance with the manufacturer's printed instructions, NFPA 90A, and UL 555. Basis of design installation is detailed on the drawings.

3.3 Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories as required to obtain proper operation and leakproof performance.

3.4 Adjusting and Cleaning:

3.4.1 Adjusting: Adjust ductwork accessories for proper settings. Install fusible links in fire dampers and adjust for proper action.

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- 3.4.2 Final positioning of manual dampers is specified in Division-23 section "Testing, Adjusting, and Balancing". However, the system shall be left functional with all dampers open or throttled.
- 3.4.3 Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.
- 3.4.4 Furnish extra fusible links to Owner, one link for every 10 installed of each temperature range; obtain receipt.

END OF SECTION 233300

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SECTION 233400 - FANS

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Extent of fan work required by this section as indicated on drawings and schedules, and by requirements of this section.
- 1.4 Coordination:
- 1.4.1 Refer to Division-7 sections for installation of prefabricated roof curbs; not work of this section. Furnishing prefabricated roof curbs is part of this section's work.
- 1.4.2 Refer to Division-23 section "Testing, Adjusting, and Balancing" for balancing of fans.
- 1.4.3 Refer to Division-23 HVAC control systems sections for control work required in conjunction with fans.
- 1.4.4 Refer to Division-26 sections for power supply wiring from power source to power connection on fans. Division-26 work will include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.
- 1.5 Codes and Standards:
- 1.5.1 AMCA Compliance: Provide fans which have been tested and rated in accordance with AMCA standards, and bear AMCA Certified Ratings Seal.
- 1.5.2 UL Compliance: Provide fans which are listed by UL and have UL label affixed.
- 1.6 Approval Submittals:
- 1.6.1 Product Data: Submit manufacturer's technical data for fans, including specifications, capacity ratings, dimensions, weights, materials, accessories furnished, and installation instructions. Submit assembly-type drawings showing unit dimensions, construction details, methods of assembly of components, and field connection details.
- Fans
Vibration Control
- 1.7 O&M Data Submittals: Submit maintenance data and parts list for each type of fan, accessory, and control. Include these data, a copy of approved submittals, and wiring diagrams in O&M Manual.

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2 PRODUCTS

2.1 General: Except as otherwise indicated, provide standard prefabricated fans of type and size indicated, modified as necessary to comply with requirements, and as required for complete installation. Provide accessories as listed in the schedule on the drawings and as described herein. Motors shall be high efficiency per Division-23 section "Motors".

2.2 Acceptable Manufacturers: Subject to compliance with requirements provide fans manufactured by Acme, Greenheck, Loren Cook, Penn or approved equal unless otherwise noted herein.

2.3 Centrifugal Roof Exhausters:

2.3.1 Housing: Provide heavy gauge aluminum hood, housing, and base with a galvanized steel frame.

2.3.2 Fan Wheels: Provide aluminum air foil type, statically and dynamically balanced.

2.3.3 Drive: Provide direct or belt drive as scheduled with pre-lubricated, ball bearing, continuous duty type motors. Provide vibration isolation equipment for the entire drive.

2.3.4 Round Hood Fans: Where indicated provide fans with motors mounted in a separate compartment out of the air stream.

2.3.5 Upblast Fans: Where indicated provide upblast discharge fans with integral grease trough and drain fitting. Motors shall be out of the air stream and cooled by clean, outside air only.

2.4 In-Line Centrifugal Fans:

2.4.1 Housing: Provide square weather tight housing constructed of aluminum or steel and painted inside and out with an epoxy finish. Provide venturi type inlet. Provide heavy duty duct collars. Housing and bearing supports shall be constructed of heavy gauge bolted and welded steel construction. Provide two sided access panels, located perpendicular to the motor mounting plane. Provide ½" insulated housing. Provide motor and drive cover for belt drive units.

2.4.2 Fan Wheels: Provide aluminum air foil type, backward curved, statically and dynamically balanced.

2.4.3 Drive: Provide direct or belt drive as scheduled with pre-lubricated, ball bearing, continuous duty type motors. Provide vibration isolation equipment for the entire drive.

2.4.4 Filter Housing: Where indicated, provide insulated filter housing with 2-inch thick disposable MERV 8 filters. Provide construction set, a clean set installed at substantial completion, and one spare set for the owner.

2.4.5 Isolation and Support: Provide spring type vibration isolators and fan support brackets.

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- 2.5 Vibration Isolation: Mount fans on vibration isolators in accordance with the requirements of Division-23 section "Vibration Isolation" and the following list.
- 2.5.1 Hangers: Type HA3.
- 2.6 Utility Sets:
- 2.6.1 Housing: Provide welded steel fan housing with epoxy coating inside and out. Provide flanged discharge in the configuration shown on the drawings or indicated in the schedule. Provide companion flange for discharge duct. Provide shaft seal and scroll drain with plug.
- 2.6.2 Fan Wheel: Provide aluminum, air foil type, statically and dynamically balanced.
- 2.6.3 Drive: Provide belt drive as scheduled, with prelubricated ball bearing, continuous duty, open drip proof motor. Provide weatherproof enclosure. Provide vibration isolation equipment to mount entire fan assembly.
- 2.6.4 Vibration Isolation: BF3
- 3 EXECUTION
- 3.1 General: Except as otherwise indicated or specified, install fans in accordance with manufacturer's installation instructions and recognized industry practices to insure that fans serve their intended function.
- 3.2 Coordinate fan work with work of roofing, walls, and ceilings as necessary for proper interfacing. Framing of openings, caulking, and curb installation is not work of this section.
- 3.3 Ductwork: Refer to Division-23 section "Ductwork". Connect ducts to fans in accordance with manufacturer's installation instructions. Provide flexible connections in ductwork at fans.
- 3.4 Install fans on vibration isolation equipment as required. Set level and plumb.
- 3.5 Roof Curbs: Provide curb adapters as required to mount fans on existing roof curbs.
- 3.6 Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to electrical Installer. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-26 sections. Verify proper rotation direction of fan wheels. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.
- 3.7 Remove shipping bolts and temporary supports within fans. Adjust dampers for free operation.
- 3.8 Testing: After installation of fans has been completed, test each fan to demonstrate proper operation of units at performance requirements specified. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected.

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- 3.9 Cleaning: Clean factory-finished surfaces. Remove all tar and soil. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 233400

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SECTION 233616 – VARIABLE VOLUME TERMINAL UNITS

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Extent of air terminals work required by this section is indicated on drawings and schedules, and by requirements of this section.
- 1.4 Refer to other Division-23 sections for external insulation of air terminals; not work of this section.
- 1.5 Refer to other Division-23 sections for testing, adjusting and balancing of air terminals; not work of this section.
- 1.6 Refer to other Division-23 sections for temperature controls which are to be furnished by others but installed as work of this section.
- 1.7 Refer to Division-26 sections for the following work; not work of this section. Power supply wiring from power source to power connection on air terminals. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.
- 1.8 Codes and Standards:
 - 1.8.1 ADC Compliance: Provide air terminals which have been tested and rated in accordance with ADC standards.
 - 1.8.2 NFPA Compliance: Construct air terminals using acoustical and thermal insulations complying with NFPA 90A "Air Conditioning and Ventilating Systems".
- 1.9 Approval Submittals:
 - 1.9.1 Product Data: Submit manufacturer's technical product data, including performance data for each size and type of air terminal furnished; schedule showing drawing designation, room location, number furnished, model number, size, and accessories furnished; and installation and start-up instructions. Submit manufacturer's assembly-type drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.

Shutoff single duct VAV boxes
- 1.10 O&M Data Submittals:
 - 1.10.1 Wiring Diagrams: Submit ladder-type wiring diagrams for electric power and control

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components, clearly indicating required field electrical connections. Include in O&M manual.

- 1.10.2 Maintenance Data: Submit maintenance data and parts list for each type of air terminal; including "trouble-shooting" maintenance guide. Include this data and a copy of approval submittals in O&M manual.

2 PRODUCTS

- 2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide air terminals of one of the following (unless otherwise noted): Trane, Titus, Enviro-Tec, Price, or approved equal.

- 2.2 General: Provide factory-fabricated and tested air terminals as indicated, selected with performance characteristics which match or exceed those indicated on schedule.

- 2.3 Shutoff Single Duct: Provide pressure independent single duct, shut-off variable volume terminal units with the following characteristics, features and accessories and as indicated on drawings and schedule.

- 2.3.1 Casings: The unit casing shall be minimum 22 gauge galvanized steel, internally lined with engineered polymer foam insulation which complies with UL 181 and NFPA 90A. Insulation shall be 1.5 pound density, closed cell foam. Exposed fiberglass is not acceptable. The insulation shall be mechanically fastened to the unit casing. All exposed insulation edges shall be coated with NFPA 90A approved sealant to prevent erosion. Provide air valve access panel in the casing. Casing and panel shall be sealed to hold leakage to 2% of rated airflow at 3.0" w.g.

- 2.3.2 Air Dampers: Damper shall be heavy gauge metal, with shaft rotating in self-lubricating nylon or equal bearings. Shaft shall be marked on the end to indicate the damper blade position. Unit shall be designed for field conversion from normally open to normally closed, or vice versa, without relocating the actuator, changing parts or adding relays. The damper shall seal against a closed-cell foam gasket, to limit close-off leakage to 10 cfm at 4.0" w.g. The damper shall not unseat at 6.0" w.g.

- 2.3.3 Provide hanger brackets for attachment of supports.

- 2.3.4 Access: Provide removable panels in casings to permit access to air dampers and other parts requiring service, adjustment, or maintenance.

- 2.3.5 Controls: Units shall have pressure independent DDC controls provided by the DDC contractor.

The unit inlet shall be equipped with a flow sensor with amplifying pressure pickup points connected to central averaging chambers. The sensor shall maintain control accuracy with the same size inlet duct in any configuration. The flow sensor shall have a minimum of three sensor points.

The terminal unit manufacturer shall supply a metal enclosure with access panel sealed from

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air flow and mounted on the side of the terminal unit to house field mounted digital controls. The terminal unit manufacturer shall provide a 120V to 24V controls transformer.

The DDC contractor shall provide an actuator. The damper shall move in a smooth, steady progression without dead spots. Refer to controls drawings for sequence of operations.

- 2.3.6 Electric Reheat Coils: Provide factory mounted heating coils with SCR controls, door interlocking disconnect, and manual reset thermal controls.
- 2.3.7 Noise Ratings: Provide terminals with the NC performance data scheduled.
- 2.4 Fan Powered Terminals: Provide constant volume fan powered terminal units with the following characteristics, features and accessories and as indicated on drawings and schedule.
- 2.4.1 Casings: Unit casing shall be minimum 22 gauge galvanized steel and fully lined with fiberglass insulation. The insulation shall comply with UL standard 181 for erosion and NFPA 90A for fire resistivity. Any cut edges of fiberglass exposed to the moving air stream shall be coated with NFPA 90 approved sealant. Casing shall be sealed to hold leakage to 2% at 3.0" water gauge.

Unit casing shall have access door which allows removal of fan and servicing of unit without disturbing duct connections.

Unit casing shall have round duct collar for the primary air connection and a rectangular discharge air connection. Casing shall be designed for hanging by sheet metal straps from a structure. All control components shall be factory installed and mounted.

- 2.4.2 Air Dampers: A primary air damper and actuator shall vary primary air in response to a thermostat signal. Damper leakage at shutoff shall not exceed 2.0% at 6 inches w.g. pressure. The damper shall be located inside the unit and shall be mechanically connected to the shaft. Provide self lubricating bearings for the shaft.
- 2.4.3 Fans: Fan blowers shall be constructed of steel with forward curved blades, dynamically balanced wheels and direct drive motor. Motors shall be of energy efficient design with integral thermal overload protection, permanently lubricated sleeve type bearings, permanent split-capacitor type and shall be designed for use with fan speed controller. Provide disconnect. Provide anti-backward rotation device. Provide torsion flex suspension and install isolation between motor and blower assembly.
- 2.4.4 Controls: Provide a flow control device that will control minimum and maximum primary cfm of the unit as scheduled. The cfm shall be factory set. The thermostat signal shall reset the flow control device to control primary air cfm to match load requirements. Control of the fan powered units shall be pressure independent.

Terminals shall incorporate a multi-point amplifying primary air sensor with center averaging chamber to insure controller compatibility with same size inlet duct at any inlet configuration. Flow measuring taps and flow curves shall be supplied with each unit for field balancing air flows.

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Provide a speed control system which allows adjustable fan speed from maximum to minimum.

The terminal shall be capable of operation as described herein down to an inlet static pressure of zero at full cooling.

Direct digital controls shall be contained in a metal enclosure provided by the terminal unit manufacturer with access panel sealed from air flow and mounted on the side of the terminal unit. All controls, including DDC controls and actuator may be field or factory mounted.

DDC controls shall be furnished by the EMCS specified in other Division 23-sections.

Units shall incorporate single point electrical and control connections for the entire unit. All electrical components shall be UL listed and installed in accordance with the National Electric Code. All line voltage electrical components shall be mounted in a NEMA 1 enclosure. The entire assembly shall be UL or ETL listed.

2.4.5 Electric Reheat Coils: Provide factory mounted heating coils with SCR controls, door interlocking disconnect, and manual reset thermal controls.

2.4.6 Operation: Provide series (continuous fan operation) as indicated in the Schedule.

3 EXECUTION

3.1 Examine areas and conditions under which air terminals are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 General: Install air terminals as indicated, and in accordance with manufacturer's installation instructions.

3.3 Location: Install each unit level and accurately in position indicated in relation to other work; and maintain sufficient clearance for normal service and maintenance, but in no case less than that recommended by manufacturer.

3.4 Duct Connections: Connect ductwork to air terminals in accordance with Division-23 ductwork sections.

3.5 Upon completion of installation and prior to initial operation, test and demonstrate that air terminals, and duct connections to air terminals, are leak-tight.

3.6 Repair or replace air terminals and duct connections as required to eliminate leaks, and retest to demonstrate compliance. Leave operational and ready for Testing and Balancing work.

3.7 Clean exposed factory-finished surfaces. Repair any marred or scratched surfaces with manufacturers touch-up paint.

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SECTION 233713 - GRILLES, REGISTERS AND CEILING DIFFUSERS

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Extent of air outlets and inlets work is indicated by drawings and schedules, and by requirements of this section.
- 1.4 Refer to other Division-23 sections for ductwork and duct accessories required in conjunction with air outlets and inlets and for balancing of air outlets and inlets; not work of this section.
- 1.5 Codes and Standards:
 - 1.5.1 ADC Compliance: Test and rate air outlets and inlets in certified laboratories under requirements of ADC 1062 "Certification, Rating and Test Manual". Provide air outlets and inlets bearing ADC Certified Rating Seal.
 - 1.5.2 NFPA Compliance: Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".
- 1.6 Approval Submittals:
 - 1.6.1 Product Data: Submit manufacturer's technical product data for air outlets and inlets indicating construction, finish, and mounting details.
 - 1.6.2 Performance Data: For each type of air outlet and inlet furnished, provide aspiration ability, temperature and velocity traverses, throw and drop, and noise criteria ratings. Indicate selections and data as required.
- 1.7 O&M Data Submittals: Submit cleaning instructions for finishes and spare parts lists. Include this data and a copy of approval submittals in O&M manual.

2 PRODUCTS

- 2.1 General:
 - 2.1.1 Except as otherwise indicated, provide manufacturer's standard grilles, registers, and ceiling diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
 - 2.1.2 Manufacturers not listed in the following specification will not be considered for approval unless accepted by addendum prior to bid.
 - 2.1.3 Performance: Provide grilles, registers and ceiling diffusers that have, as minimum,

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temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device equal to the basis of design.

- 2.1.4 Ceiling and Wall Compatibility: Provide grilles, registers and diffusers with border styles that are compatible with adjacent wall and ceiling systems, and that are specifically manufactured to fit into ceiling module or wall with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems and walls which will contain each type of ceiling diffuser, grille, or register.
- 2.1.5 Appearance: All grilles and registers shall be aluminum construction and all diffusers shall be steel or aluminum construction, unless otherwise noted, with uniform matching appearance for each type of outlet. Ceiling mounted grilles and registers shall be set to be sight tight from the predominant exposure.
- 2.1.6 Finish: All ceiling mounted grilles, registers, and diffusers shall be finished with manufacturer's standard color to be selected by the architect. Wall and door mounted grilles and registers shall be finished with clear anodized finish .
- 2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products by Titus, Price, Krueger, or Metal Aire.
- 2.3 Rectangular Ceiling Diffusers: Provide rectangular face, adjustable diffuser with removable inner core, no corner joints. If square or rectangular neck is provided, provide square to round adaptor as required. Provide lay-in panel as required. Provide beveled trim ring for diffusers in hard ceilings.
- 2.4 Square Ceiling Diffusers: Provide square face, adjustable, 360 degree pattern diffusers with one-piece stamped cones, no corner joints, round necks. Provide lay-in panel as required.
- 2.5 Return Grilles : Provide return grilles with one set of 45 degree fixed louvers, parallel to the long dimension. Provide mounting frame for all wall and plaster ceiling installations.

3 EXECUTION

- 3.1 Coordinate installation with ceiling and light fixture installation. Locate ceiling outlets as indicated on architectural Reflected Ceiling Plans. Unless otherwise indicated, locate ceiling outlets in the center of acoustical ceiling modules with sides parallel to the grid.
- 3.2 Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended functions.
- 3.3 Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.
- 3.4 Set air volumes to values shown on the drawings so that the system is functional. Leave ready for test and balance contractor.

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- 3.5 Furnish to Owner three operating keys for each type of outlet and inlet that require them; obtain receipt.

END OF SECTION 233713

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SECTION 233726 - WALL LOUVERS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of wall louver work is indicated by drawings and schedules, and by the requirements of this section.

1.4 Refer to other Division-23 sections for ductwork, duct accessories and controls work.

1.5 AMCA Compliance: Test and rate louvers in accordance with AMCA Standard 500. Provide AMCA certified rating seal. Ratings based on tests and procedures performed in accordance with AMCA 500-L and complying with the AMCA 511 Certified Ratings Program. AMCA Certified Ratings Seal applies to air performance, water penetration and wind driven rain ratings.

1.6 Product Qualifications:

1. Miami-Dade County, Florida Notice of Acceptance (NOA).
2. Florida Building Code Approval.
3. Louver shall be certified to Florida Building Code Testing Application Standards TAS 100(A) (Wind Driven Rain Resistance), TAS 201 (Large Missile Impact), TAS 202 (Uniform Static Air Pressure) and TAS 203 (Cyclic Wind Loading).
4. AMCA Listed for compliance to AMCA 540 Level E and AMCA 550 standards.

1.7 Approval Submittals:

1.7.1 Product data: Submit manufacturer's technical product data for louvers including: model number, accessories furnished, construction, finish, mounting details, performance data.

1.8 O&M Data Submittals: Submit maintenance data, including cleaning of finishes and a copy of approval submittals. Include in O&M manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, submit products by Ruskin, Greenheck, Arrow, American Warming and Ventilating, or AMCA labeled approved equal.

2.2 General: Except as otherwise indicated, provide manufacturer's standard louvers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation. Provide Kynar 500 coated, corrosion resistant finish and 5 year warranty; color to be selected by the Owner.

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- 2.3 Substrate Compatibility: Provide louvers with 9 inch frame, flange and sill extension piece that are compatible with adjacent substrate, and that are specifically manufactured to fit into construction openings with accurate fit and adequate support, for weatherproof installation. Refer to general construction drawings and specifications for types of substrate which will contain each type of louver.
- 2.4 Materials: Construct of aluminum extrusions, Alloy 6063-T6 0.081" thick for frame and 0.081" thick for front blades and 0.060" thick for back blades. Weld units or use stainless steel fasteners.
- 2.5 Sill Flashing: Formed aluminum, 0.080" thick, upturned sides to prevent water leakage.
- 2.6 Installation Angles: Material: 1.375 x 2.25 inch x 0.125 inch thick continuous aluminum angles around louver perimeter for installation in concrete, deep CMU, steel and wood substrate wall systems.
- 2.7 Installation Plates: Material: 0.250 inch (6.4 mm) thick continuous aluminum flat or zee plates for installation in thin CMU substrate wall systems.
- 2.8 Louver Screens: On inside face of exterior louvers, provide 1/2" square mesh anodized aluminum wire bird screens mounted in removable extruded aluminum frames.
- 2.9 Stationary Louvers: Hurricane and impact rated louvers, basis of design is Greenheck EHV-901D.
- 2.10 Performance Data:
1. Performance Ratings: AMCA licensed.
 - a. Based on testing 48 inches x 48 inches size unit in accordance with AMCA 500-L.
 2. Free Area: 42 percent, nominal.
 3. Free Area Size: 6.66 square feet.
 4. Maximum Recommended Air Flow through Free Area: 2,155 feet per minute.
 5. Air Flow: 10,431 cubic feet per minute.
 6. Maximum Pressure Drop (Intake): 0.60 inches w.g..
 7. Water Penetration: Beginning point of water penetration of 0.01 ounce per ft² of free area shall be above 1,250 feet per minute free area velocity.
 8. Wind Load Rating: Maximum wind load of ±150 PSF.
 9. AMCA 500-L Wind Driven Rain Performance: 99.9 percent effective at preventing water penetration through louver when tested at 50 miles per hour wind with 8 inches per hour rainfall and 2,155 feet per minute airflow through the free area. Penetration Class 'A' with Discharge Class (Intake) '3' in accordance with AMCA 500-L Wind Driven Rain Test.

3 EXECUTION

- 3.1 Install where shown on the drawings in accordance with the manufacturer's printed instruction

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and Florida Product Approval. Exercise care to prevent scratches.

3.2 Isolate dissimilar metals per the manufacturer's recommendations.

3.3 Verify size of louvers shown on drawings prior to fabrication. Coordinate with existing wall openings.

END OF SECTION 233726

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SECTION 23 81 43 - PACKAGED AIR CONDITIONING UNITS (DX)

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Refer to other Division-23 sections for testing, adjusting, and balancing of air conditioning units (RTUs).
- 1.4 Approval Submittals:
 - 1.4.1 Product Data: Submit manufacturer's technical product data, including dimensions, ratings, electrical characteristics, weight, capacities, materials of construction, and installation instructions.
 - 1.4.1.1 Packaged air conditioning units
 - 1.4.1.2 Vibration Isolation
 - 1.5 O&M Data Submittals: Submit manufacturer's maintenance data including parts lists. Include these data, a copy of approval submittals, product data, and wiring diagrams in O&M manual.

2 PRODUCTS

- 2.1 Quality Assurance:
 - 2.1.1 Provide units tested by UL, ARL or ETL.
 - 2.1.2 Construct refrigeration system in accordance with ASHRAE 15 (ANSI B 9.1) "Safety Code for Mechanical Refrigeration".
 - 2.1.3 Test and rate in accordance with the applicable ARI standards and provide certified rating seal. Sound test and rate units in accordance with ARI 270.
 - 2.1.4 Provide units with an EER that meets the Florida Energy Efficiency Code and the schedules on the drawings.
 - 2.1.5 Acceptable Manufacturers: Subject to compliance with requirements provide units by: Carrier, Trane, Lennox, Daikin or approved equal.
- 2.2 General:
 - 2.2.1 Units shall be factory-assembled, wired and tested. All controls shall be factory-adjusted and preset to the design conditions.

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- 2.2.2 Casings: Construct of heavy gauge steel (or aluminum) formed panels rigidly reinforced and braced. Each unit shall be provided with removable panels to permit the unit (including fans and compressors) to be properly maintained and serviced. Entire casing shall be painted with factory-applied finish. Casing for outdoor units shall be provided with weatherproof construction with all seams bolted. Provide stainless steel hardware. Units shall be sealed to minimize leakage.
- 2.2.3 Base: The base pan of the entire unit shall be sealed against moisture leakage after fabrication.
- 2.2.4 Curb: Provide 12" high (above roof surface) continuous-welded, full perimeter supports of galvanized steel construction, insulated with 1" thick fiberglass.
- 2.3 Condensing Section:
- 2.3.1 Condenser Fans and Drives: Fan shall be of rustproof construction: hot-dipped galvanized steel, stainless steel or aluminum. Unit shall have a variable speed motor suitable for the duty indicated. Provide a close fretwork galvanized steel or non-ferrous fan and guard. Motors shall be the permanently lubricated type, resiliently mounted.
- 2.3.2 Condenser Coil: Construct of copper tubes and aluminum fins. Provide inlet guard to protect condenser fins. Provide seacoast or heresite coating on the condenser coil.
- 2.3.3 Compressor: Shall be scroll, design for R410a refrigerant with vibration isolation. Each compressor shall have separate refrigerant circuit. Motors shall be ball bearing, high starting torque, low starting current type for compressor service. Compressors shall not produce objectionable noise or vibration inside the building. Compressors shall have five (5) year warranty.
- 2.3.4 Service Valves: Provide for high and low pressure readings.
- 2.4 Evaporator Section:
- 2.4.1 Interior of unit shall be thermally and acoustically insulated with minimum R=4.2 insulation. Provide aluminum inner liner. Provide removable panels to permit the unit to be properly serviced and maintained.
- 2.4.2 The evaporator shall include centrifugal fan, fan motor, direct drive and lubricated bearings. Motors shall be high efficiency type as per Division-23, Basic Mechanical Materials and Methods section, "Motors". Provide cooling coils constructed of copper tubes and aluminum fins. Filters and coils shall be selected for a maximum face velocity of 500 fpm. Provide thermal expansion valve, sight glass, refrigerant drier, strainer, controls and other necessary devices for a completely automatic unit.
- 2.4.3 Each unit shall be equipped with sloped IAQ drain pans under the entire evaporator coil to prevent condensate carry-over.

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2.5 Electric Heater Section:

2.5.1 Provide electric heating coils controlled by one or more magnetic contactors. Three phase coils shall be wired for balanced current in each wire, if possible. Furnish and install necessary overheating and air flow controls to meet the requirements of the National Electric Code. Provide built-in air flow switch and heater interlock relay.

2.5.2 Heaters shall be factory mounted and wired with all required fuses and contactors to provide single point connection.

2.6 Unit Controls:

2.6.1 All safety and operational controls shall be factory wired.

2.6.2 Safety and Operational Control Features:

Internal compressor overtemperature protection.

Crankcase heaters.

Individual motor overcurrent protection.

High pressure cutout.

Low pressure cutout.

Anti-recycle timer (5 minute)

Timer-type defrost control.

Liquid line solenoid.

Hot gas bypass.

2.6.3 Room thermostat shall be low voltage, remote-mounted with sub-base and thermometer for controlling heating and cooling cycles. The fan selector shall include "AUTO-ON" controls. The system selector shall include "OFF-COOL-HEAT-EM HT" controls. Provide automatic changeover thermostats with fan that run continuously. The room thermostats shall be manually adjustable by occupants and shall indicate setting and temperature in degrees Fahrenheit. Provide two heating stages.

2.6.4 Outdoor air thermostat shall energize electric heat below 35° F on call for heating by second stage of room thermostat.

2.6.5 Emergency heat switch shall allow operation of all electric heat.

2.7 Basic Vibration Isolation: Provide vibration isolation products complying with Division-23 section "Vibration Isolation" and the following list:

2.7.1 Bases and Frames: Type BF4 BF5

3 EXECUTION

3.1 Installation: Install in accordance with producer's printed instructions. Anchor housing to

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curb with cadmium plated self-tapping screws, lag screws, or bolts, as directed by curb construction. Secure unit to withstand 125 mph wind velocity. The curb shall be installed by the roofing contractor.

- 3.2 Cleaning: Clean tar and all other soil from housing exterior. Leave ready for Division 7, Caulking Work.
- 3.3 Brush out fins on all coils.
- 3.4 Condensate Drain: Pipe trapped copper condensate drain (full size of unit outlet) to the nearest floor/roof system drain or as shown on the drawings. Refer to Division-23 section "Insulation" for pipe insulation.
- 3.5 Construction Filters: Provide 2" thick filters in all units during construction. After construction (but prior to the test and balance being performed) install clean final filters.
- 3.6 Startup: Check entire assembly for correctness of installation, alignment, and control sequencing. Start all component parts in proper sequence. Make all adjustments required to insure proper smooth quiet operation.

END OF SECTION 238143

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SECTION 260500 - ELECTRICAL GENERAL REQUIREMENTS**PART 1 - GENERAL****1.1 SUMMARY**

The Electrical General Requirements are supplementing and applicable to Division 26 Sections and shall apply to all phases of work specified herein, shown on the Drawings, or required to provide a complete installation of electrical systems. Section 26 is sub-divided for convenience only.

A. This Section includes the following:

1. Job Conditions
2. Regulatory Requirements
3. Electrical equipment coordination and installation.
4. Submittals, Operating and Maintenance instructions and As-built drawings.
5. Common electrical installation requirements.
6. Warranty of work.

1.2 JOB CONDITIONS:

- A. SITE INSPECTIONS:** Before submitting proposals, each bidder should visit the site and fully familiarize himself with all job conditions and shall be fully informed as to the extent of his work. No consideration will be given after bid opening date for alleged misunderstanding as to the requirements of work involved in connecting to the utilities or as to requirements of materials to be furnished. The contractor shall contact the utility prior to bid and make appropriate provisions in such bid as required by the utility for the utility's routing and connection.
- B. SCHEDULED INTERRUPTIONS:** Planned interruptions of utilities service, to any facility affected by this contract, shall be carefully planned and approved by Architect at least ten (10) days in advance of the requested interruption. The Contractor shall not interrupt services until the Architect has granted specific approval. The request shall indicate services to be affected, date and time of interruption and duration of outage. Request for interruption of service will not be approved until all equipment and materials required for the completion of that particular phase of work are on the job site. The work may have to be scheduled after normal working hours.
- C. ACCIDENTAL INTERRUPTIONS:** All excavation and/or remodeling work required shall be performed with care so as not to interrupt other existing services (water, gas, electrical, sewer, sprinklers, etc.). If accidental utility interruption resulting from work performed by the Contractor occurs, service shall be immediately restored to its original condition without delay, by and at the expense of the Contractor, using skilled workmen of the trade required.

1.3 REGULATORY REQUIREMENTS:

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- A. **PERMITS, FEES, AND INSPECTIONS:** This Contractor shall secure and pay for all permits, and inspections required on work performed under this section of the Specifications. He shall assume full responsibility for all assessments and taxes necessary for the completion and acceptance of the work.
- B. **APPLICABLE STANDARDS AND CODES:** The electrical installation shall comply with all applicable building codes; local, state, and federal ordinances; and the 2017 edition of the National Electrical Code. In case of a discrepancy among these applicable regulatory codes and ordinances, the most stringent requirement shall govern. The Contractor shall notify the Architect in writing of any such discrepancy. Should the Contractor perform any work that does not comply with the applicable regulatory codes and ordinances he shall bear all cost arising in correcting the deficiencies. Application standards and codes shall include all local ordinances, all state laws, and the applicable requirements of the following:
1. American National Standards Institute - ANSI
 2. National Electrical Manufacturer's Association - NEMA
 3. National Fire Protection Association – NFPA (latest editions)
 4. The Life Safety Code – NFPA 101, as adopted in Florida Edition
 5. The National Fire Alarm Code – NFPA 72, as adopted in Florida Edition
 6. Florida Building Code, latest Edition
 7. Underwriters' Laboratories, Inc. – UL
- C. **DRAWINGS AND SPECIFICATIONS:** The drawings and these specifications are complementary each to the other. What is called for by one shall be as binding as if called for by both. Omissions from the drawings and specifications of details of work which are evidently necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the Contractor from performing such work. In any case of discrepancy in the figures or catalog numbers, the matter shall be submitted to the Architect, who shall promptly make a determination in writing. Any adjustment by the Contractor shall be at the Contractor's own risk and expense. Electrical drawings are diagrammatic only. Do not scale these drawings. All equipment shall be installed in accordance with manufacturer's recommendations and any conflicting data shall be verified before bidding.
- D. The Contractor shall after completion of the work, furnish the Architect a certificate of final inspection and approval from the applicable local inspection department. Make necessary changes to plans and specifications to meet code standards at no additional cost to the Owner.
- 1.4 **COOPERATION:**
- A. **INTERFACING WITH OTHER CRAFTS:** It shall be the responsibility of the Contractor to cooperate and coordinate with all other crafts working on this project. This Contractor shall do all cutting, trenching, backfill and structural removals to permit entry of the electrical system components. The General Contractor shall do all patching and finishing.

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- B. EQUIPMENT FURNISHED UNDER OTHER SECTIONS: This Contractor shall furnish and install, complete electrical roughing-in and connections to all equipment furnished under other sections and indicate on drawings. This includes all outlets as shown on mechanical, telecom, and electrical drawings. All such equipment shall be set in place as work of other sections.
- C. HEATING AND AIR CONDITIONING:
1. The Contractor shall furnish all branch circuit wiring to motors and control panels or centers including disconnects, receptacles, switches, and appurtenances to which the system at the units may be connected, to provide a complete system of wiring for power. Control equipment and control circuit wiring is specified in the Mechanical Section.
 2. Control devices to be included in the branch circuit, except those furnished integral with the equipment, will be delivered by the Heating and Air Conditioning Contractor and installed by the Electrical Contractor.
- 1.5 WORKMANSHIP: All work shall be executed in a neat and substantial manner by skilled workman, well qualified, and regularly engaged in the type of work required. Substandard work shall be removed and replaced by the Contractor at no cost to the Owner.
- 1.6 APPROVAL OF MATERIALS AND EQUIPMENT:
- A. PRIOR-SUBMITTALS: The Contractor shall base his proposal on the materials specified herein and on the drawings. Reference to a particular product by manufacturer, trade name, or catalog number establishes the quality standards of material and equipment required for this installation and is not intended to exclude products equal in quality and similar design. The Architect reserves the sole right to decide the equality of materials proposed for use in lieu of these specified. It shall be the Contractor's responsibility to furnish the information and data sufficient to establish the quality and utility of the items in question, including furnishing of samples if required.
- B. SUBMITTALS:
1. Submittals: The Contractor shall submit a list of equipment proposed for installation. He shall submit catalog data and shop drawings on all proposed systems and their components. Where substitutions alter the design or space requirements, the Contractor shall defray all items of cost for the revised design and construction including costs to all allied trades involved. Provide an electronic copy and (1) hard copy to the engineer of submittals and shop drawings as a minimum unless the General Conditions requires a greater number of copies.
 - a. Submittals Schedule: Submittals shall be submitted within thirty (30) days after the contract is awarded. It is not the responsibility of the Engineer to expedite the review of submittals if the contractor has not adequately prepared the submittals in a time efficient manner. The contractor bears all the responsibility for the added time requirements of resubmittals.
 - b. Identification: Place a permanent label or title block on each submittal for identification. Each major section of submittals such as power equipment, lighting

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equipment, fire alarm, etc., shall be secured in a booklet or stapled with a covering index which lists the following information:

- 1) Project name and date
- 2) Name, address, and phone number of General contractor and project manager.
- 3) Name, address, and phone number of Sub-contractor and project manager.
- 4) Supplier of equipment with phone number and person responsible for this project.
- 5) Index of each item covered in submittal and model number.
- 6) Any deviation from contract documents shall be specifically noted on submittal cover index and specifically identified with highlighting, encircling, or boldly on specific submittal sheet.

c. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

- 1) Include previous submittal review comments.
- 2) For each item being resubmitted, include previous review comment and explain how resubmitted item meets the criteria of the previous review comment.

2. Electrical and Mechanical/Plumbing/Fire Protection Equipment Coordinations:

The electrical power equipment submittals shall be accompanied by a letter verifying coordination of electrical services for all mechanical, plumbing, and fire protection equipment requiring power. The letter shall follow the format listed below.

To: _____
(General Contractor)

Re: _____
(Project name and location)

We the undersigned subcontractors certify that we have coordinated the electrical requirements for mechanical, plumbing, and fire protection sprinkler equipment as evidenced by the coordination chart listed herein.

Item	Load Full Load Amps	1 Phase or 3 Phase	Number of Electrical Connections	Maximum Overcurrent Protection	Minimum Overcurrent Protection	Breaker Proposed	Circuit Proposed

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The above list details all required electrical connections for mechanical equipment.

Signed: _____

For: _____
Mechanical Subcontractor

The above list details all required electrical connections for plumbing equipment.

Signed: _____

For: _____
Plumbing Subcontractor

The above list details all required electrical and fire alarm connections for fire protection equipment.

Signed: _____

For: _____
Fire Protection Sprinkler Subcontractor

The above list of equipment has been reviewed and the required connections are being provided. (Any exceptions or request for direction shall be listed here)

Signed: _____

For: _____
Electrical Subcontractor

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. **PROTECTION:** Take necessary precautions to protect all material, equipment, apparatus and work from damage. Failure to do so to the satisfaction of the Architect will be sufficient cause for the rejection of the material, equipment or work in question. Contractor is responsible for the safety and good condition of the materials installed until final acceptance by the owner.
- B. **CLEANING:** Conduit openings shall be capped or plugged during installation. Fixtures and equipment shall be tightly covered and protected against dirt, moisture, chemical and mechanical injury. At the completion of the work the fixtures, material and equipment shall be thoroughly cleaned and delivered in condition satisfactory to the Architect.

1.8 TESTING AND BALANCING: Make tests that may be required by the Owner or the Architect in connection with the operation of the electrical system in the buildings. Balance all single-phase loads connected to all panelboards in the buildings to insure approximate equal divisions of these loads on the main secondary power supply serving the buildings. All tests shall be made in

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accordance with the latest standards of the IEEE and the NEC. The installation shall be tested for performance, grounds and insulation resistance. A "megger" type instrument shall be used. Contractor shall perform circuit continuity and operational tests on all equipment furnished or connected by Contractor. The tests shall be made in the presence of the Architect or his representative. The Contractor shall notify the Architect at least twenty-four (24) hours in advance of tests. The Contractor shall provide all testing equipment and all costs shall be borne by him. Written reports shall be made of all tests. All faults shall be corrected immediately.

- A. A letter shall be written giving the following:
1. Measured amps on each phase of each panel.
 2. Resistance to ground of each new grounding electrode.
 3. Measured voltage phase to phase and phase to neutral at each panel.
 4. Ground continuity and polarity instrument used.

1.9 OPERATING AND MAINTENANCE INSTRUCTIONS/AS BUILT DRAWINGS:

- A. Four (4) complete sets of instructions containing the manufacturer's operating and maintenance instructions for each piece of equipment shall be furnished to the Owner. Each set shall be permanently bound and shall have a hard cover. One complete set shall be furnished at the time that the test procedure is submitted, and remaining sets shall be furnished before the Contract is completed. Flysheets shall be placed before instructions covering each subject. The instruction sheets shall be approximately 8-1/2" by 11" with large sheets of Drawings folded in. The instructions shall include information for major pieces of equipment and systems.
- B. Upon completion of the work and at the time designated, the services of one project engineer shall be provided by the Contractor to instruct the representative of the Owner in the operation and maintenance of the systems.
- C. This Contractor shall provide as-built Drawings at the completion of the job. Drawings shall show all significant changes in equipment, wiring, routing, location, etc. All underground conduit routing shall be accurately indicated with locations dimensioned. As-built drawings shall be submitted for review as red-lined on a field hard copy. After review by the Architect, the Contractor will be given digital AutoCAD files and shall make revisions and resubmit final on disk.

- 1.10 GUARANTEE AND SERVICE: Upon completion of all tests and acceptance, the Contractor shall furnish the Owner a written guarantee covering the electrical work done for a period of one (1) year from date of acceptance. Guarantee includes equipment capacity and performance ratings specified without excessive noise levels. Upon notice from the Architect or the Owner, the Contractor shall, during the guarantee period, rectify and replace any defective material or workmanship and repair any damage caused thereby without additional cost.

PART 2 - PRODUCTS

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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 raceways and piping systems installed at a required slope.

END OF SECTION 260500

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SECTION 260510 – ELECTRICAL METHODS AND BASIC MATERIALS

PART 1 - GENERAL

1.1 SECTION INCLUDES:

- A. SUPPORTS
- B. EXCAVATION, TRENCHING, AND BACKFILLING
- C. CUTTING AND PATCHING
- D. EQUIPMENT CONNECTION
- E. IDENTIFICATION OF EQUIPMENT
- F. CLEANING AND PAINTING

PART 2 - PRODUCTS

2.1 SUPPORTS:

- A. FRAMING STEEL: Galvanized or painted rolled steel of standard shapes and sizes.
- B. MANUFACTURED CHANNEL: Hot dipped galvanized with all hardware required for mounting as manufactured by Unistrut, Steel City, or approved equal.
- C. MISCELLANEOUS HARDWARE: Standard sizes treated for corrosion resistance.

2.2 IDENTIFICATION:

- A. NAMEPLATES: Laminated black micarta with ¼” high engraved white letters.
- B. PANEL DIRECTORIES: Typewritten under plastic cover.
- C. WIRE AND CABLE MARKERS: Cloth, split sleeve, or tubing type.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Products shall be installed in accordance with manufacturer’s instructions.

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- B. Install support systems sized and fastened to accommodate weight of equipment and conduit, including wiring, which they carry.
1. Fasten hanger rods, conduit clamps, and outlet junction boxes to building structure using pre-cast insert system, expansion anchors, preset inserts, beam clamps, or spring steel clips.
 2. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion and anchors on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.
 3. Do not fasten supports to piping, ceiling support wires, ductwork, mechanical equipment, or conduit.
 4. Do not use powder-actuated anchors.
 5. Do not drill structural steel members without written consent from the Architect.
 6. Fabricate supports from structural steel or steel channel.
 7. Install surface mounted cabinets and panel boards with minimum of four anchors.
 8. Provide steel channel supports to stand cabinets one inch off wall in wet locations.
 9. Bridge studs top and bottom with channels to support flush mounted cabinets and panel boards in stud walls.
- C. Excavating, trenching, and backfilling shall be accomplished as indicated on the Drawings or where required to install systems and/or equipment.
1. Trenches for all underground conduits or equipment shall be excavated to the required depths. Where soft, wet, or unstable soil is encountered, the bottom of the trench shall be filled with 6 inches of compacted gravel and sand fill. All trench bottoms shall be tamped hard. Trenches shall be shored as required to meet OSHA requirements and general safe working conditions.
 2. After conduits or equipment have been inspected and approved by the Architect and prior to backfilling, all forms shall be removed and the excavation shall be cleaned of all trash and debris. Material for backfilling shall consist of the excavation, or borrow of sand, gravel, or other materials approved by the Architect and shall be free of trash, lumber or other debris. Backfill shall be placed in horizontal layers, not exceeding 9 inches in depth and properly moistened to approximate optimum requirements. Each layer shall be compacted by hand, or machine tamped to a density equivalent to surrounding soil. Backfill shall be brought to suitable elevation above ground to provide for anticipated settlement and shrinkage. All paving broken up shall be repaired and returned to the original condition.

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3. All exterior underground conduits shall have an underground (metal foil) tape installed 12 inches above conduit identified as ELECTRICAL to aid in future location of conduit.
 4. All underground conduits shall have an underground red tape installed 12" above conduit.
- D. **CUTTING AND PATCHING:** This Contractor shall provide all cutting, digging, etc., incident to his work and shall make all required repairs thereafter to the satisfaction of the Architect, but in no case shall the Contractor cut into any major structural element, beam, or column without written approval of the Architect.
1. Pavements, sidewalks, roads, curbs, walls, ceilings, floors, and roofs shall be sawcut, patched, repaired and/or replaced as required to permit the installation of the electrical work. Existing concrete floors and other slabs, which require vertical piercing for installation of conduit raceways shall be neatly core drilled. The Contractor shall carefully lay out his drilling in advance and arrange it to minimize exposed work.
 2. The Contractor shall bear the expense of all cutting, patching, painting, repairing, or replacing of the work of other trades required because of his fault, error, or tardiness or because of any damage done by him.
 3. All patching, and finishing shall be performed by the General Contractor.
- E. Make electrical connections to equipment in accordance with equipment manufacturer's instructions.
1. Verify that wiring and outlet rough-in work is complete and that equipment is ready for electrical connection, wiring, and energization.
 2. Make wiring connections in control panel or in wiring compartment of pre-wired equipment. Provide interconnecting wiring where indicated.
 3. Install and connect disconnect switches, controllers, control stations, and control devices as indicated.
 4. Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit in damp or wet locations.
 5. Install pre-fabricated cord set where connections with attachment plug is indicated or specified, or use attachment plug with suitable strain-relief clamps.
 6. Provide suitable strain-relief clamps for cord connections to outlet boxes and equipment connection boxes.
- F. Identify electrical distribution and control equipment, and loads served, to meet regulatory requirements and as specified herein.
1. Degrease and clean surface to receive nameplates.

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2. Secure nameplates to equipment fronts using screws or rivets with edges parallel to equipment lines.
 3. Each new panel shall have an external nameplate. Disconnect switches, starters or similar devices shall have a micarta engraved nameplate mechanically affixed indicating the load served and the location, such as "A/C 2" or "A/C 3 above ceiling". Letters shall be ¼" white on a black background. Panels shall be designated in this manner:

"Panel A
120/208 Volts
3 Phase 4 Wire
Served from Panel MP"
 4. Panel directories shall accurately indicate load served and location of load.
 5. Engrave plates as indicated on the Drawings.
- G. Raceway junction boxes for each system shall be identified by painting the inside of the junction box cover for exposed work and both sides of the covers for concealed work according to the following code:
- | | |
|--------------------------|-------|
| Receptacle Circuits | Black |
| 120 V. Lighting Circuits | White |
| 208 V. Power & Misc. | Green |
| Fire Alarm System | Red |
- If the established color code at this site conflicts with the above, the contractor shall so state in a letter outlining his proposed colors to maintain conformity
- H. Install wire markers on each conductor in panel board gutters, boxes, and at load connections.
 1. Use distribution panel and branch circuit or feeder number to identify power and lighting circuits.
 2. Use control wire number as indicated on schematic and interconnection diagrams or equipment manufacturer's shop drawings to identify control wiring.
 - I. Cleaning and Painting: The respective Contractors for the various phases of work shall clear away all debris, surplus materials, etc., resulting from their work or operations, leaving the job and equipment furnished in the clean first class condition.
 1. All fixtures and equipment shall be thoroughly cleaned of plaster, stickers, rust, stains and other foreign matter or discoloration, leaving every part in an acceptable condition ready for use.

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2. The Contractor shall refinish and restore to the original condition and appearance, all electrical equipment, which has sustained damage to manufacturer's prime and finish coats or enamel or paint. Materials and workmanship shall be equal to the requirements described for other painting.

END OF SECTION 260510

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SECTION 260519 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS OR LESS)

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.2 SUBMITTALS

- A. Field quality-control test reports.

1.3 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

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 CONDUCTORS AND CABLES

- A. Manufacturers:
 - 1. American Insulated Wire Corp.; a Leviton Company.
 - 2. General Cable Corporation.
 - 3. Senator Wire & Cable Company.
 - 4. Southwire Company.
 - 5. Okonite

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- B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.
- C. Conductor Material: Copper. Solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger. Aluminum conductors using compact sector stranding will be permitted for circuits 100 amps and above. Contractor shall upsize conductor and conduits for aluminum equivalents and submit for approval.
- D. Conductor Insulation Types: THHN-THWN and SO.

2.3 CONNECTORS AND SPLICES

- A. Manufacturers: AFC Cable Systems, Inc.
 - 1. AMP Incorporated/Tyco International.
 - 2. Hubbell/Anderson.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.
 - 4. 3M Company; Electrical Products Division.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.
- C. Connections from boxes to lay-in fixtures in grid ceiling may be made with MC (metal clad) cable cut to minimum length.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

- A. Service Entrance: Type THHN-THWN, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspace: Type THHN-THWN, single conductors in raceway.
- E. Exposed Branch Circuits, including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- G. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.

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- H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.
- I. Fire Alarm Circuits: Type THHN-THWN, in raceway.
- J. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- K. Class 2 Control Circuits: Power-limited cable, concealed in building finishes.

3.2 INSTALLATION

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Raceways and Boxes for Electrical Systems."
- F. Seal around cables penetrating fire-rated elements according to Division 21 Section "Firestop Systems and Sleeves."
- G. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."
- H. 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. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- I. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.3 FIELD QUALITY CONTROL

- A. Testing: Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.
- B. 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.

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END OF SECTION 260519

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SECTION 260523 – FIRESTOP SYSTEMS AND SLEEVES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Through penetration firestop systems.
 2. Sleeves for raceways and cables.
 3. Sleeve seals.

1.2 PERFORMANCE REQUIREMENTS

- A. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per UL 1479:
1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
 2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - a. Penetrations located outside wall cavities.
 - b. Penetrations located outside fire-resistance-rated shaft enclosures.
 3. L-Rated Systems: Where through-penetration firestop systems are indicated in smoke barriers, provide through-penetration firestop systems with L-ratings of not more than 3.0 cfm/sq. ft (0.01524cu. m/s x sq. m) at both ambient temperatures and 400 deg F (204 deg C).
- B. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
- C. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."

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- B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
 - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 - 2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems bearing classification marking of qualified testing and inspecting agency.
- D. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- E. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application that are produced by one of the following manufacturers:
 - 1. A/D Fire Protection Systems Inc.
 - 2. Hilti, Inc.
 - 3. Nelson Firestop Products.
 - 4. NUCO Inc.
 - 5. RectorSeal Corporation (The).
 - 6. Specified Technologies Inc.
 - 7. 3M; Fire Protection Products Division.
 - 8. Tremco; Sealant/Weatherproofing Division.

2.2 FIRESTOPPING

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

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- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

2.3 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. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Coordinate sleeve selection and application with selection and application of firestopping.

2.4 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 2. Pressure Plates: Plastic. Include two for each sealing element.
 - 3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.1 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:

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1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
- D. Identification: Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. Include the following information on labels:
1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 4. Date of installation.
 5. Through-penetration firestop system manufacturer's name.
 6. Installer's name.

3.2 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage an independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.
- B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
- C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.3 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Coordinate sleeve selection and application with selection and application of firestopping.
- C. 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.

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- 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 (50 mm) above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- 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.
- 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.
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall 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.
- M. Underground, Exterior-Wall Penetrations: Install "wall pipes" for sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

END OF SECTION 260523

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SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes methods and materials for grounding systems and equipment.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with 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.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

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2.2 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel, sectional type; 3/4 inch in diameter by 20 feet long (19 mm by 3 m).

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.
- B. Underground Grounding Conductors: Install insulated copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches (600 mm) below grade.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

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1. Feeders and branch circuits.
 2. Lighting circuits.
 3. Receptacle circuits.
 4. Single-phase motor and appliance branch circuits.
 5. Three-phase motor and appliance branch circuits.
 6. Flexible raceway runs.
 7. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
- B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- C. Water Heater and Heat-Tracing Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- D. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.
- E. Signal and Communication Equipment: For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch (6-by-50-by-300-mm) grounding bus.
 2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- F. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

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.
- B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.

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1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
 2. For grounding electrode system, install at least two rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
 3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.
- D. Grounding and Bonding for Piping: Provide grounding for all new metal pipes.
- E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
1. After installing new grounding electrode systems but before permanent electrical circuits have been energized, test for compliance with requirements.
 2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells.
 - a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
- B. Report measured ground resistances that exceed 5 ohms.

END OF SECTION 260526

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SECTION 260529 - ELECTRICAL SUPPORTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

1.2 SUBMITTALS

- A. Product Data: Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of support component used.
- B. Shop Drawings for Supports: For supports and their attachments to structure not defined on Drawings, identify hardware, and indicate analysis, forces, strengths, materials, and dimensions, signed and sealed by a qualified professional engineer.

1.3 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed under this Project, with a minimum structural safety factor of five the applied force.

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- B. Steel Slotted Support Systems: Comply with MFMA-3, factory-fabricated components for field assembly, and provide finish suitable for the environment in which installed.
1. Available Manufacturers:
 - a. Cooper B-Line; a division of Cooper Industries.
 - b. ERICO International Corporation.
 - c. Allied Support Systems; Power-Strut Unit.
 - d. GS Metals Corp.
 - e. Michigan Hanger Co., Inc.; O-Strut Div.
 - f. National Pipe Hanger Corp.
 - g. Thomas & Betts Corporation.
 - h. Unistrut; Tyco International, Ltd.
 - i. Wesanco, Inc.
 2. Channel Dimensions: Selected for structural loading.
- C. Raceway and Cable Supports: As described in NECA 1.
- D. 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.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. 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. Available Manufacturers:
 - 1) Cooper B-Line; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti, Inc.
 - 4) ITW Construction Products.
 - 5) MKT Fastening, LLC.
 - 6) Powers Fasteners.
 2. Concrete Inserts: Steel or malleable-iron slotted-support-system units similar to MSS Type 18; complying with MFMA-3 or MSS SP-58.

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3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
4. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A 325.
5. Toggle Bolts: All-steel springhead type.
6. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 for application of hangers and supports for electrical equipment and systems, unless requirements in this Section or applicable Code are stricter.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 for installation requirements, except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. 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 (90 kg).
- D. 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. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
 6. To Light Steel: Sheet metal screws.
 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount on slotted-channel racks attached to substrate.

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- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions.
- B. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so expansion anchors will be a minimum of 10 bolt diameters from edge of the base.
 - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around full perimeter of the base.
 - 2. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - 3. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 5. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 - 6. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete.

3.5 INSTALLATION OF SEISMIC-RESTRAINT COMPONENTS

- A. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- B. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- C. Restraint Cables: Provide slack within maximums recommended by manufacturer.
- D. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, upper truss chords of bar joists, or at concrete members.

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3.6 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Make flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross expansion joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to electrical equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

END OF SECTION 260529

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SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. See Division 26 Section "Firestop Systems and Sleeves" for firestopping materials and installation at penetrations through walls, ceilings, and other fire-rated elements.
- C. See Division 26 Section "Electric Methods and Basic Materials" for supports, anchors, and identification products.
- D. See Division 26 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

1.2 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets indicated.
- B. Shop Drawings: Show fabrication and installation details of components for raceways, fittings, boxes, enclosures, and cabinets.

1.3 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

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.

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2.2 METAL CONDUIT AND TUBING

A. Manufacturers:

1. AFC Cable Systems, Inc.
2. Alflex Inc.
3. Anamet Electrical, Inc.; Anaconda Metal Hose.
4. Electri-Flex Co.
5. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
6. LTV Steel Tubular Products Company.
7. Manhattan/CDT/Cole-Flex.
8. O-Z Gedney; Unit of General Signal.
9. Wheatland Tube Co.

B. Rigid Steel Conduit: ANSI C80.1.

C. EMT and Fittings: ANSI C80.3.

1. Fittings: Steel, Set-screw or compression type. No die-cast.

D. LFMC: Flexible steel conduit with PVC jacket.

E. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.3 NONMETALLIC CONDUIT AND TUBING

A. Manufacturers:

1. American International.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. Arncorp Corp.
4. Cantex Inc.
5. Certainteed Corp.; Pipe & Plastics Group.
6. Condux International.
7. ElecSYS, Inc.
8. Electri-Flex Co.
9. Lamson & Sessions; Carlon Electrical Products.
10. Manhattan/CDT/Cole-Flex.
11. RACO; Division of Hubbell, Inc.
12. Spiralduct, Inc./AFC Cable Systems, Inc.
13. Thomas & Betts Corporation.

B. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.

C. RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.

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2.4 METAL WIREWAYS

- A. Manufacturers:
 - 1. Hoffman.
 - 2. Square D.
- B. Material and Construction: Sheet metal sized and shaped as indicated.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.
- E. Wireway Covers: Screw-cover type.
- F. Finish: Manufacturer's standard enamel finish.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. Emerson/General Signal; Appleton Electric Company.
 - 3. Erickson Electrical Equipment Co.
 - 4. Hoffman.
 - 5. Hubbell, Inc.; Killark Electric Manufacturing Co.
 - 6. O-Z/Gedney; Unit of General Signal.
 - 7. RACO; Division of Hubbell, Inc.
 - 8. Thomas & Betts Corporation.
 - 9. Walker Systems, Inc.; Wiremold Company (The).
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- G. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

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- H. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

2.6 FACTORY FINISHES

- A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard paint applied to factory-assembled surface raceways, enclosures, and cabinets before shipping.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors:

1. Exposed: Rigid steel.
2. Concealed: Rigid steel.
3. Underground, Single Run: SCH 40 PVC.
4. Underground, Grouped: SCH 40 PVC.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
6. Boxes and Enclosures: NEMA 250, Type 3R.

B. Indoors:

1. Exposed: EMT in unfinished areas where shown or permitted.
2. Concealed: EMT.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFMC in damp or wet locations or where exposed to view (not concealed).
4. Damp or Wet Locations: Rigid steel conduit.
5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
 - a. Damp or Wet Locations: NEMA 250, Type 4, nonmetallic.
6. Flexible metal conduit: Where applications are not concealed by the building construction, liquid tight flexible conduit and grounding type fittings shall be used and system shall be fully bonded.

- C. Minimum Raceway Size: 1/2-inch trade size (DN 16), except underground shall be 3/4" minimum.

- D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

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3.2 INSTALLATION

- A. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- B. Complete raceway installation before starting conductor installation.
- C. Support raceways as required by NEC.
- D. Install temporary closures to prevent foreign matter from entering raceways.
- E. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above finished slab.
- F. Make bends and offsets so ID is not reduced. Keep legs of bends in same plane and keep straight legs of offsets parallel, unless otherwise indicated.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
 - 1. Install concealed raceways with a minimum of bends in shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
- H. Raceways Embedded in Slabs: Install in middle 1/3 of slab thickness where practical and leave at least 2 inches (50 mm) of concrete cover.
 - 1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
 - 2. Space raceways laterally to prevent voids in concrete.
 - 3. Run conduit larger than 1-inch trade size (DN 27) parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 4. Change from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor, except PVC branch circuits may rise concealed in walls to first box maximum 48" AFF.
- I. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
 - 1. Run parallel or banked raceways together on common supports.
 - 2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- J. Join raceways with fittings designed and approved for that purpose and make joints tight.
 - 1. Use insulating bushings to protect conductors.
- K. Tighten set screws of threadless fittings with suitable tools.

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- L. Terminations:
1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
 2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
- M. Install pull cords in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull cord.
- N. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where otherwise required by NFPA 70.
- O. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches (150 mm) above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.
- P. Flexible Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations or where exposed to view (not concealed). Install separate ground conductor across flexible connections.
- Q. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.
- R. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.3 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets 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 PVC or paint finishes with matching touchup coating recommended by manufacturer.

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END OF SECTION 260533

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SECTION 260553 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Identification for conductors and communication and control cable.
2. Warning labels and signs.
3. Equipment identification labels.

1.2 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

1.4 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.

PART 2 - PRODUCTS

2.1 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

A. Marker Tape: Vinyl or vinyl -cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.2 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.

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- C. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 7 by 10 inches (180 by 250 mm).
- D. Fasteners for Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.
- E. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 mm)."

2.3 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and ultraviolet-resistant seal for label.
- B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

PART 3 - EXECUTION

3.1 APPLICATION

- A. Auxiliary Electrical Systems Conductor and Cable Identification: Use marker tape to identify field-installed alarm, control, signal, sound, intercommunications, voice, and data wiring connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and cable pull points. Identify by system and circuit designation.
 - 2. Use system of designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
- B. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply baked-enamel warning signs. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.
 - 1. Equipment with Multiple Power or Control Sources: Apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.

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2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.
- C. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
 - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where 2 lines of text are required, use labels 2 inches (50 mm) high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label, drilled for screw attachment.
 - c. Elevated Components: Increase sizes of labels and legend to those appropriate for viewing from the floor.
 2. Equipment to Be Labeled:
 - a. Panelboards, electrical cabinets, and enclosures.
 - b. Electrical switchgear and switchboards.
 - c. Disconnect switches.
 - d. Enclosed circuit breakers.
 - e. Motor starters.
 - f. Push-button stations.
 - g. Power transfer equipment.
 - h. Contactors.
 - i. Receptacles: Provide panel and circuit designation.

3.2 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 nonadhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

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- F. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.
1. Color shall be factory applied.
 2. Colors for 208/120-V Circuits: (unless existing color code is different)
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - d. Neutral: White.

END OF SECTION 260553

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SECTION 260923 – LIGHTING CONTROLS AND DEVICES

PART 1 – GENERAL

1. SECTION INCLUDES

- A. Network lighting control system and components:
 - 1. Lighting management panels
 - 2. Lighting management modules
 - 3. Low voltage wall stations
 - 4. Wired sensors

2. RELATED DOCUMENTS

- A. Section 262726 Wiring Devices
- B. Section 265100 Interior Lighting Fixtures

1.3 SUMMARY

- A. The lighting control system specified in this section shall provide time-based, sensor-based (both occupancy and daylight), and manual lighting control
- B. The system shall be capable of turning lighting loads on/off as well as dimming lights (if lighting load is capable of being dimmed). Specific dimmers will be capable of “dimming lights to off”
- C. The system architecture shall be capable of enabling stand-alone groups (rooms) of devices to function in some default capacity, even if network connectivity to the greater system is lo

1.4 SUBMITTALS

- A. Product Datasheets (general device descriptions, dimensions, electrical specifications, wiring details, nomenclature)
- B. Riser Diagrams – typical per room type (detailed drawings showing interconnectivity of devices)
- C. Other Diagrams – as needed for special operation or interaction with other system(s)
- D. Example Contractor Startup/Commissioning Worksheet – must be completed prior to factory start-up
- E. Hardware and Software Operation Manuals.

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F. Other operational descriptions as needed.

1.5 ON-SITE COMMISSIONING REQUIREMENTS

A. Pre-Wire Meeting Requirements

1. Certified Technician will meet onsite with the electrical contractors to coordinate installation details, review best practices, and discuss project specific challenges. This should happen prior to the installation being started, enabling the contractors to work with a lighting systems expert to prepare and make changes up prior to installation commencement.

B. A manufacturer's lighting systems team works onsite, after fixture and controls installation is completed. The project is reviewed and checked for proper wiring, installation and functionality of the system as a whole. Any problems are addressed and resolved with the onsite contractors. If fixture addressing is required, the manufacturer's technicians will perform this task in accordance with the intended lighting design.

C. Onsite programming requirements

1. Manufacturer's technicians map out the fixture locations and addresses within the lighting control software. Astronomic timeclock events, scenes, and schedules are programmed per a pre-defined script. These events, scenes, and schedules are tested and finalized for final approval by the project's ownership.

D. Training requirements

1. Manufacturer's technicians provide training for system users and the system maintenance team. The details of the technology are covered from a maintenance and troubleshooting point of view. This covers the lighting control system and its core functionality, with a focus on how to edit existing scenes and astronomic lighting events.
2. The manufacturer's representative will provide in-depth training to the end user on managing the specific control system, giving them the tools and knowledge to operate their system.

1.6 PROJECT CLOSEOUT DOCUMENTATION

A. Provide a factory published manual

1. Warranty
2. Technical support contact
3. Electronic manual on manufacturer's website for free download

1.5 QUALITY ASSURANCE

A. All components and the manufacturing facility where product was manufactured must be RoHS compliant.

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- B. In high humidity or cold environments, the sensors shall be conformably coated and rated for condensing humidity and -40 degree Fahrenheit (and Celsius) operation.
- C. All applicable products must be UL / CUL Listed or other acceptable national testing organization.

1.6 PROJECT CONDITIONS

- A. Only install equipment after the following site conditions are maintained:
 - 1. Ambient Temperature 14 to 105 degrees F (-10 to 40 degrees C)
 - 2. Relative Humidity less than 90% non-condensing
- B. Standard electrical enclosures are permanently installed
- C. Equipment is protected from dust, debris and moisture

1.7 WARRANTY

- A. Five (5) year 100% parts replacement

1.8 MAINTENANCE & SUSTAINABILITY

- A. Provide new parts, upgrades, and/or replacements available for a minimum of 5 years available to the end user
- B. Provide free telephone technical support

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Basis of controls design Manufacturer:
*Acuity Brands, One Lithonia Way
Conyers GA 30012
www.acuitycontrols.com*
- B. Substitutions: Permitted with PRIOR APPROVAL ONLY:
 - 1. All substitutions must be submitted in writing for approval at least 14 days prior to bid date.
 - 2. Proposed substitute products must be documented with a line by line compliance review.
 - 3. Proposal substitute must provide contractor submittal revised lighting plans, lighting control risers and details.

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2.2 SYSTEM REQUIREMENTS

- A. System shall have an architecture that is based upon two main concepts;
 - 1. intelligent lighting control devices
 - 2. standalone lighting control zones
- B. Intelligent lighting control devices shall consist of one or more basic lighting control components; occupancy sensors, photocell sensors, relays, dimming outputs, manual switch stations, and manual dimming stations. Combining one or more of these components into a single device enclosure should be permissible so as to minimize overall device count of system.
- C. System must interface directly with LED luminaires.
- D. Lighting control zones shall consist of one or more intelligent lighting control components, be capable of stand-alone operation, and be capable of being connected to a higher level network backbone.
- E. Individual lighting zones must continue to provide a user defined default level of lighting control in the event of a system communication failure with the backbone network or the management software becoming unavailable.
- F. Individual lighting zones shall be capable of being segmented into several “local” channels of occupancy, photocell, and switch functionality for more advanced configurations and sequences of operation.
- G. System shall be capable of operating a lighting control zone according to several sequences of operation. System shall be able to change a spaces sequence of operation according to a time schedule so as to enable customized time-of-day, day-of-week, utilization of a space. Note: Operating modes should be utilized only in manners consistent with local energy codes.
 - 1. Auto-On / Auto-Off (via occupancy sensors)
 - a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
 - b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
 - c. Pressing a switch will turn lights off. The lights will remain off regardless of occupancy until switch is pressed again, restoring the sensor to Automatic On functionality.
 - 2. Manual-On / Auto-Off (also called Semi-Automatic)
 - a. Pushing a switch will turn lights on.
 - b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
 - 3. Manual-On to Auto-On/Auto-Off
 - a. Pushing a switch will turn lights on.

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- b. After initial lights on, zones with occupancy and/or photocell sensors turn lights on/off according to occupancy/vacancy and/or daylight conditions.
 - c. Sequence can be reset via scheduled (ex. daily each morning) events.
 4. Auto-to-Override On
 - a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
 - b. Zone lighting then goes into an override on state for a set amount of time, or until the next time event returns the lighting to an auto-off style of control.
 - c. Sequence can be reset via scheduled (ex. daily each morning) events.
 5. Manual-to-Override On
 - a. Pushing a switch will turn lights on.
 - b. Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.
 - c. Sequence can be reset via scheduled (ex. daily each morning) events.
 6. Auto On / Predictive Off
 - a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
 - b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
 - c. Pressing the switch will turn the lights off and a short “exit timer” begins. After the timer expires, sensor scans the room to detect whether occupant is still present. If no occupancy is detected, zone returns to auto-on. If occupancy is detected, lights must be turned on via the switch.
 7. Multi-Level Operation (multiple lighting levels per manual button press)
 - a. Operating mode designed specifically for bi-level applications.
 - b. Enables the user to cycle through up to four potential on/off/dim low/dim high lighting states using only a single button.
 - c. Eliminates user confusion as to which of two buttons controls which load
 - d. Three different transition sequences are available in order to comply with energy codes or user preference).
 - e. Mode available as a setting on all devices that have single manual on/off switch.
 - f. Depending on the sequence selected, every button push steps through relay/dimming states according to below table
 - g. In addition to achieving bi-level lighting control by switching loads with relays, the ability to command dimming outputs to “step” in a sequence that achieves bi-level operation is present.

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MLO Mode		State of load after each pushbutton press			
		1st Press	2nd Press	3rd Press	4th Press
2-State (Alternating)	Load A	On	Off	Off	-
	Load B	Off	On	Off	-
2-State (Both On, A First)	Load A	On	On	Off	-
	Load B	Off	On	Off	-
2-State (Both On, B First)	Load A	Off	On	Off	-
	Load B	On	On	Off	-
3-State	Load A	On	Off	On	Off
	Load B	Off	On	On	Off
A and B On ¹	Load A	On	Off	-	-
	Load B	On	Off	-	-
A On Only ¹	Load A	On	Off	-	-
	Load B	Off	Off	-	-
A and B On & Dim High ¹	Load A	High	Off	-	-
	Load B	High	Off	-	-
Dim Low / High	Load A	Low	High	Off	-
Dim Low / High	Load A	High	Low	Off	-

NOTE 1: Modes for use only when Auto-On state of Load A & B is different than first MLO state

2.3 INDIVIDUAL DEVICE SPECIFICATIONS

A. Networked system occupancy sensors

1. Occupancy sensors shall sense the presence of human activity within the desired space and fully control the on/off function of the lights.
2. Sensors shall utilize passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state, thus preventing false on conditions. Ultrasonic or Microwave based sensing technologies shall not be accepted.
3. For applications where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions), a sensor with an additional “dual” technology shall be used.
4. Dual technology sensors shall have one of its two technologies not require motion to detect occupancy. Acceptable dual technology includes PIR/Microphonics (also known as Passive Dual Technology or PDT) which both looks for occupant motion and listens for sounds indicating occupants. Sensors where both technologies detect motion (PIR/Ultrasonic) shall not be acceptable.
5. All sensing technologies shall be acoustically passive, meaning they do not transmit sounds waves of any frequency (for example in the Ultrasonic range), as these technologies have the potential for interference with other electronic devices within the

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space (such as electronic white board readers). Acceptable detection technologies include Passive Infrared (PIR), and/or Microphonics technology. Ultrasonic or Microwave based sensing technologies shall not be accepted.

6. Sensors shall be available with zero or one integrated dry contact switching relays, capable of switching 1 amp at 24 VAC/VDC (resistive only).
 7. Sensors shall be available with one or two occupancy “poles”, each of which provides a programmable time delay.
 8. All sensors shall have two RJ-45 ports or capable of utilizing a splitter.
 9. All sensors shall have the ability to detect when it is not receiving valid communication and blink its LED in a pattern to visually indicate of a potential wiring issue
 10. Every sensor parameter shall be available and configurable remotely from the software and locally via the device push-button.
 11. Sensors shall be able to function together with other sensors in order to provide expanded coverage areas.
 12. Sensors shall be equipped with an automatic override for 100 hour burn-in of lamps. This feature must be available at any time for lamp replacements.
 13. Wall switch sensors shall recess into single-gang switch box and fit a standard GFI opening.
 14. Wall switch sensors must meet NEC grounding requirements by providing a dedicated ground connection and grounding to mounting strap. Line and load wire connections shall be interchangeable. Sensor shall not allow current to pass to the load when sensor is in the unoccupied (Off) condition.
 15. Wall switch sensors shall have optional features for photocell/daylight override, and low temperature/high humidity operation.
 16. Wall switch sensors shall be available in four standard colors (Ivory, White, Light Almond, Gray)
 17. Wall switch sensors shall be available with optional raise/lower dimming adjustment controls.
 18. Network system shall have sensors that can be embedded into luminaire such that only the lens shows on luminaire face.
 19. Embedded sensors shall be capable of both PIR and Dual Technology occupancy detection
 20. Embedded sensors shall have an optional photocell
 21. Network system shall also have ceiling, fixture, recessed, & corner mounted sensors available.
 22. Sensors shall have optional features for photocell/daylight override, dimming control, and low temperature/high humidity operation.
- B. Networked system power (relay) packs
1. Power Packs shall incorporate one Class 1 relay, a 0-10 VDC dimming output, and contribute low voltage power to the rest of the system. Secondary Packs shall incorporate the relay and 0-10 VDC or line voltage dimming output, but shall not be required to contribute system power. Power Supplies shall provide system power only, but are not required to switch line voltage circuit.
 2. Power Packs shall accept 120 or 277 VAC (or optionally 347 VAC), be plenum rated, and provide Class 2 power to the system.
 3. Every Power Pack parameter shall be available and configurable remotely from the software and locally via the device push-button.

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4. Power Pack shall securely mount to junction location through a threaded ½ inch chase nipple or be capable of being secured within a luminaire ballast channel. Plastic clips into junction box shall not be accepted. All Class 1 wiring shall pass through chase nipple into adjacent junction box without any exposure of wire leads. Note: UL Listing under Energy Management or Industrial Control Equipment automatically meets this requirement, whereas Appliance Control Listing does not meet this safety requirement.
 5. When required by local code, Power Pack must install inside standard electrical enclosure and provide UL recognized support to junction box. All Class 1 wiring is to pass through chase nipple into adjacent junction box without any exposure of wire leads.
 6. Power Packs (Secondary) shall be available that provide up to 16 Amp switching of all lighting load types.
 7. Power Packs shall be available that provide up to 5 Amps switching of all lighting load types as well as 0-10 VDC dimming or fluorescent ballasts/LED drivers.
 8. Specific Secondary Packs shall be available that provide up to 5 Amps of switching and can dim 120/277 VAC magnetic low voltage transformers.
 9. Specific Secondary Packs shall be available that provide up to 4 Amps of switching and can dim 120 VAC electronic low voltage transformers.
 10. Specific Power/Secondary Packs shall be available that are UL924 listed for switching of Emergency Power circuits.
 11. Specific Secondary Packs shall be available that control louver/damper motors for skylights.
 12. Specific Secondary Packs shall be available that provide a pulse on/pulse off signal for purposes of controlling shade systems via relay inputs.
 13. Power (Secondary) Packs shall be available that provide up to 20 Amps switching of general purposed receptacle (plug-load) control.
- F. Networked auxiliary input / output (i/o) devices
1. Devices shall be plenum rated and be inline wired, screw mountable, or have an extended chase nipple for mounting to a ½” knockout.
 2. Devices shall have two RJ-45 ports
 3. Specific I/O devices shall have a dimming control output that can control 0-10 VDC dimmable ballasts or LED drivers by sinking up to 20 mA of current.
 4. Specific I/O devices shall have an input that reads a 0-10 VDC signal from an external device.
 5. Specific I/O devices shall have a switch input that can interface with either a maintained or momentary switch and run a switch event (toggle the lighting load) or run a local/remote control profile.
 6. Specific I/O devices shall sense state of low voltage outdoor photocells.
 7. Specific I/O devices shall sense momentary and maintained contact closures, and either toggle a connected load after a momentary contact or ramp the load high/low during a maintained contact (stopping when the contact releases).
- G. Networked system wall switches & dimmers
1. Devices shall recess into single-gang switch box and fit a standard GFI opening.
 2. All devices shall provide toggle switch control. Dimming control and low temperature/high humidity operation are available options.
 3. Devices shall be available in four colors (Ivory, White, Light Almond, Gray).
 4. Devices with mechanical push-buttons shall provide tactile and LED user feedback.

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5. Devices with mechanical push-buttons shall be made available with custom button labeling
6. Devices with a single “on” button shall be capable of selecting all possible lighting combinations for a bi-level lighting zone such that the user confusion as to which of two buttons (as is present in multi-button scenarios) controls which load is eliminated.

H. Networked system scene controllers

1. Device shall have two, three, four, or eight buttons for selecting programmable lighting control profiles or acting as on/off switches.
2. Devices shall be available in four colors (Ivory, White, Light Almond, Gray).
3. Device shall recess into single-gang switch box and fit a standard GFI opening.
4. Devices shall provide LED user feedback.
5. Device shall be capable of reprogramming other devices in its zone so as to implement user selected lighting scene.
6. Device shall be capable of selecting a lighting profile be run by the system’s upstream Gateway so as to implement selected lighting profile across multiple zones (and not just its local zone).
7. Device shall have LEDs indicating current selection.

End of Section 260943

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SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Single and duplex receptacles, ground-fault circuit interrupters, and integral surge suppression units.
2. Single- and double-pole snap switches and dimmer switches.
3. Device wall plates.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.
- D. Field quality-control test reports.

1.3 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 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. Wiring Devices:
 - a. Bryant Electric, Inc./Hubbell Subsidiary.
 - b. Hubbell Incorporated; Wiring Device-Kellems.

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- c. Leviton Mfg. Company Inc.
 - d. Pass & Seymour/Legrand; Wiring Devices Div.
 - 2. Multioutlet Assemblies:
 - a. Hubbell Incorporated; Wiring Device-Kellems.
 - b. Wiremold Company (The).
- 2.2 RECEPTACLES
- A. Straight-Blade-Type Receptacles: Comply with NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL 498.
 - B. Straight-Blade and Locking Receptacles: Heavy-Duty grade.
 - C. Straight-Blade Receptacles: Manufacturer's top grade below Hospital grade.
 - D. GFCI Receptacles: Straight blade, feed-through type, Heavy-Duty grade, with integral NEMA WD 6, Configuration 5-20R duplex receptacle; complying with UL 498 and UL 943. Design units for installation in a 2-3/4-inch- (70-mm-) deep outlet box without an adapter.
- 2.3 PENDANT CORD/CONNECTOR DEVICES
- A. Description: Matching, locking-type plug and receptacle body connector, NEMA WD 6, Configurations L5-20P and L5-20R, Heavy-Duty grade.
 - 1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.
 - 2. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.
- 2.4 SWITCHES
- A. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.
 - B. Snap Switches: Heavy-Duty grade, quiet type.
 - C. Combination Switch and Receptacle: Both devices in a single gang unit with plaster ears and removable tab connector that permit separate or common feed connection.
 - 1. Switch: 20 A, 120/277-V ac.
 - 2. Receptacle: NEMA WD 6, Configuration 5-20R.
 - D. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible frequency and EMI/RFI filters.

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1. Control: Continuously adjustable slider; with single-pole or three-way switching to suit connections.
2. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.
3. LED Dimmer Switches: Modular; compatible with dimmer drivers; trim potentiometer to adjust low-end dimming; dimmer-driver combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.5 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: Smooth Metal 302/304 stainless steel with satin finish.
 3. Material for Unfinished Spaces: Smooth Metal 302/304 stainless steel with satin finish except where shown surface shall be "bell" die-cast aluminum with similar plates.
 4. Material for Wet Locations: Cast aluminum with in-use lift cover, and listed and labeled for use in "wet locations."

2.6 FINISHES

- A. Color:
 1. Wiring Devices: Gray

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install devices and assemblies level, plumb, and square with building lines.
- B. Install wall dimmers to achieve indicated rating after derating for ganging.
- C. Install unshared neutral conductors on line and load side of dimmers.
- D. 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.
- E. Remove wall plates and protect devices and assemblies during painting.

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3.2 IDENTIFICATION

- A. Comply with Division 26 Section "Identification for Electrical Systems."

3.3 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding."
- B. Connect wiring according to Division 26 Section "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. After installing wiring devices and after electrical circuitry has been energized, test every outlet for proper polarity, ground continuity, and compliance with requirements.
 - 2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.
- B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION 262726

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SECTION 264313 - SURGE PROTECTIVE DEVICES

PART 1 – GENERAL

1.1 SUMMARY:

This section describes the quality, performance, and installation of Parallel Connected, AC Power, Panel Type, Surge Protective Devices (SPDs).

1.2 QUALITY ASSURANCE:

All Surge Protective Devices (SPDs) shall be tested and *listed* to *ANSI/UL 1449-2006 (UL 1449 3rd Edition)* and Complimentary Listed to UL 1283 by an independent testing agency, with the experience and capability to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a Nationally Recognized Testing Laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction. This agency must comply with ANSI/IEEE C62.45 test procedures for all categories established in C62.41 (1991). “Manufactured in accordance with UL 1449” is not equivalent to being listed to ANSI/UL 1449-2006 and does not meet the intention of this specification.

1.3 CODES AND STANDARDS:

- A. ANSI/IEEE Std C62.41.1TM-2002, IEEE Guide on the Surge Environment in Low- Voltage (1000 V and Less) AC Power Circuits
- B. ANSI/IEEE Std C62.41.2TM-2002, IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits
- C. ANSI/IEEE Std C62.45TM -2002, IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits
- D. ANSI C84.1, American National Standard for Electric Power Systems and Equipment – Voltage Ratings (60 Hertz)
- E. ANSI/IEEE Standard 1100-2005, IEEE Recommended Practice for Power and Grounding Electronic Equipment (Emerald Book) - Clause 8.6.1
- F. National Fire Protection Association (NFPA) 70 (N.E.C.) – 2002 - Article 285
- G. ANSI/UL Standards 1449-2006 Listed (UL 1449 Third Edition), UL 1283 Listed, CUL Listed & CE compliant “low-voltage directive.”
- H. IEEE Standard C62.72TM - 2007 – IEEE Guide for the Application of Surge-Protective Devices for Low-Voltage (1000 V or less) AC Power Circuits

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1.4 MANUFACTURER QUALIFICATIONS:

- A. All surge suppression devices shall be manufactured by an ISO 9001-2000 certified company normally engaged in the design, development, and manufacture of such equipment, with at least 10 years of engineering experience in the design and manufacture of permanently connected SPD devices.
- B. The surge suppressor manufacturer shall provide unlimited free replacement of the entire SPD for all inoperable SPD units during the warranty period.
- C. Subject to compliance with specification requirements, provide products by one of the following:
 - 1. Surge Suppression Incorporated
 - 2. Intermatic, Inc
 - 3. Liebert
 - 4. Advanced Protection Technologies

1.5 SUBMITTALS:

- A. Surge suppression submittals shall include, but shall not be limited to the following items:
- B. Complete schematic data for all suppressors indicating part numbers, conductor sizes, etc.
- C. Dimensioned drawing of each suppressor type indicating mounting arrangement.
- D. Manufacturer's ANSI/UL 1449-2006 Third Edition listing classification page and listing number(s).
- E. Manufacturer's UL 1283 listing classification page and listing number(s).
- F. Certified test data from independent third party NRTL documenting ANSI/IEEE C62.41-2002 performance and the ability of the device to meet or exceed all requirements of this specification. Include complete let-through voltage/measured limiting voltage test data (not Voltage Protection Rating), test graphs, and scope traces for each mode for each product submitted for Category's C, B, A (including Cat A, 2 kV, 67 A, 100 kHz ring wave at both 90 & 270-degree electrical phase angles).
- G. Letter from manufacturer stating products are in strict compliance with the recommendations of IEEE Standard 1100-2005, Clause 8.6.1 and incorporate 10 individual dedicated discrete modes of protection for three-phase Wye systems, including direct line-to-line components. (Reduced-mode variations will not be accepted).
- H. Certificate of declaration that product is CE low voltage directive compliant
- I. Statement of manufacturer's warranty duration and replacement policy.

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PART 2 - PRODUCTS**2.1 REQUIREMENTS:**

- A. All SPDs shall be tested and listed to ANSI/UL 1449-2006 (UL 1449 3rd Edition) & Complimentary Listed to UL 1283 by a Nationally Recognized Testing Laboratory (NRTL) (i.e. CSA, UL, etc)
- B. The Surge Protective Devices (SPDs) shall be of a parallel-connected design using fast-acting transient energy protection components that will divert and dissipate the surge energy.
- C. The SPD shall be self-restoring and fully automatic.
- D. The SPD shall be tested and listed by an NRTL as a complete assembly to a symmetrical fault current rating greater than or equal to the available fault current at the location of installation at the connected panel, in accordance with NEC Article 285 and shall be marked with the short circuit current rating (SCCR). If the available fault current is unknown, then the SCCR of the SPD shall be 200 kAIC.
- E. Permanently connected devices mounted parallel to the service, and 208/120V sub panels are required.
- F. The SPD shall have a Nominal Discharge Current (I_n) of 20 kA. ((The Nominal Discharge Current Test was designed to establish that the SPD remains functional after 15 surges at various currents (3 kA, 5 kA, 10 kA, and 20 kA) using the test procedure described in ANSI/UL 1449-2006. 20kA is the most severe.))

Fusing:

- 1. The SPD shall provide as a minimum, over-current, over temperature protection in the form of component-level thermal fusing to ensure safe failure and prevent thermal runaway. This component-level fusing shall be an integral part of the MOV itself and not silver wire (or other) independently laid across each MOV.
- 2. Surge protective devices shall contain integral short circuit current safety fusing within each device for over-current requirements of the NEC. This fusing will be independent of the "component-level" fusing and be specifically for over-current protection and shall be constructed utilizing surge rated, cartridge fuses and not rated 'silver-fuse-wire' (or other).
- 3. The use of any mechanical or electro-mechanical thermal/over-current protection (i.e. moving parts and/or springs and shutters) in combination with or for the protection of the suppression elements is not permitted.
- 4. The fusing mechanisms employed must effectively coordinate their performance in conjunction with the high current abnormal over-voltage testing under ANSI/UL 1449-2006 (a.k.a. UL 1449 3rd Edition).

MCOV: The SPD shall have a maximum continuous operating voltage (MCOV) capable of sustaining 115% of nominal RMS voltage continuously without degrading.

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Component Limitations: The SPD shall only use solid-state clamping components to limit the surge voltage and divert the surge current. SPD components that “crowbar” short-circuit the AC power system (e.g. spark gaps, gas tubes, selenium cells, or SCR’s) shall not be acceptable. Device circuitry shall be bi-directional, enclosed in a UL listed encapsulated thermal stress reducing compound, and be of a parallel design.

Protection Modes: The SPD system shall provide (per IEEE Std. 1100-1999 8.6.1) dedicated, independent, distinct, individual protection circuitry for every possible mode in the electrical distribution system at the point of SPD application. For example, a 277/480V or 120/208V, 3-phase Wye, 4-wire plus ground system has 10 distinct modes that require independent and dedicated protection (i.e., L1-L2, L2-L3, L3-L1, L1-N, L2-N, L3-N, L1-G, L2-G, L3-G, N-G). None of these modes of protection depend on protection elements purposed for other protection modes. Reduced mode SPD with only 3, 4, or 7 dedicated, distinct, independent protection modes are not acceptable. When a mode of protection is specified, the protective mode shall be included. Thus, Line-to-Neutral-to-Line is *not acceptable* where Line-to-Line is Specified.

Status Indicators: SPD units shall have panel front status monitors as a minimum to indicate a continuous positive status of each protected phase. A remote audible alarm option must be supplied where the specifying engineer deems it necessary and cost effective under the circumstances. Refer to the appropriate drawings and schedules for these details.

Equipment Certification: Items shall be listed to ANSI/UL 1449-2006, shall bear the seal of the NRTL, shall bear the Marking “Listed to UL 1449”, shall have been tested under ANSI/UL 1449-2006, and shall be marked in accordance with the referenced standard. SPD units shall be UL 1283 Listed as an Electromagnetic Interference Filter and marked accordingly. All surge suppression devices shall be manufactured by an ISO 9001-2001 certified company normally engaged in the design, development, and manufacture of such equipment.

Circuit Configuration: The circuit configuration of the suppression units shall be bi-directional, thermal stress reducing, encapsulated, custom parallel connected, and solid state. (Series units or units equipped with “load carrying” components are expressly prohibited due to the possibility of single point series failures causing power interruption to protected loads.)

Enclosures: Unless otherwise noted, provide NEMA 1 or better enclosure for indoor mounting and NEMA 4 enclosure or better for all outdoor locations. All units will contain Form C, N/O or N/C, dry relay contacts, if so specified, and weatherproof fittings to maintain the required NEMA integrity.

Maintenance Restrictions: No suppression unit shall be supplied which requires scheduled preventive maintenance or replacement parts. Units requiring functional testing, special test equipment, or special training to monitor surge protection device (SPD) status are not acceptable. SPD shall require NO routine maintenance. SPD devices are considered non-repairable items and shall be fully replaced upon failure.

Commonality: All SPDs at the service entrance, distribution panels, and sub-panels shall be from the same manufacturer.

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All SPDs shall meet or exceed the following performance criteria:

Service Entrance (Category C): Service Entrance (Category C): The SPD shall provide a minimum protection of 240kA per phase (three-phase Wye) and be capable of meeting the Category C-High Let-Through Voltage criteria as shown in the Section VII, below.

Branch Panels/Panelboards (Category A): The SPD shall provide a minimum protection of 120kA per phase and be capable of meeting the Category B-High Let-Through Voltage criteria as shown in the Section VII, below.

2.2 ANSI/IEEE C62.41 LET-THROUGH VOLTAGE

- A. The SPD shall meet the Let-Through Voltage requirements shown in the tables below for voltage and locations specified. All voltages shall be peak ($\pm 10\%$) Positive Polarity, Time base = 10 μ S, Sampling Rate = 500ms/s to ensure maximum transient capture. [These settings assure Let-through Voltage test results are accurate]. Surge voltages shall be measured from the insertion of the surge on the sine wave to the peak of the surge. All tests are Static (unpowered), except for the 120V circuits that are Dynamic (powered). Let-through voltages on static tests calculated by subtracting sine wave peak from let-through measured from zero. All tests shall be performed in accordance with UL 1449 Third Edition with measurements performed at a point on the leads 15.24 cm (6 inches) outside of the device enclosure. No data measured at a module, lugs, component, or undefined location will be accepted. These settings assure Let-through Voltage test results are accurate. SPDs shall meet the following criteria:

Service Entrance: (277/480V, 3 Phase 4 Wire)

ANSI/IEEE Cat. C Impulse Wave The let-through voltage based on ANSI/IEEE C62.41 and C62.45 recommended procedures for the ANSI/IEEE Cat. C Impulse Wave (20kV, 10,000 amps) at the 90 degree phase angle, shall be less than (values are total let-through voltage (LTV) measured from the insertion point of the transient on the sine wave to the peak of the transient):

Mode / Voltage	277/480Y
L-N	1075V
L-L	1350V
L-G	1275V
N-G	1585V

Panelboards: (120/208V 3 Phase 4 Wire)

ANSI/IEEE Cat. B Combination Wave Impulse Let-Through Voltage: The let-through voltage based on ANSI/IEEE C62.41 and C62.45 recommended procedures for the ANSI/IEEE Cat. B Combination Wave Impulse (6kV, 3000 amps) at the 90-degree phase angle, shall be less than; (values are total let-through voltage (LTV) measured from the insertion point of the transient on the sine wave to the peak of the transient):

Mode / Voltage	120/208Y
L-N	390V

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L-L	580V
L-G	400V
N-G	575V

PART 3 - EXECUTION

3.1 WARRANTY

- A. All SPD devices shall be warranted to be free from defects in materials and workmanship under normal use in accordance with the instructions provided for a period of ten (10) years from date of substantial completion.
- B. Any SPD device that shows evidence of failure or incorrect operation, including damage as the result of lightning strikes, during the warranty period shall be replaced as a complete unit (not just modules, subassemblies, or components) by the manufacturer at no charge to the owner. Warranty will provide for multiple exchanges of any inoperable devices at any time during the warranty period that starts at the date of substantial completion of the system to which the surge suppressor is installed.
- C. SPD manufacturers whose warranty does not meet the requirements listed above standard shall submit a letter extending the warranty to meet these standards with the product submittal.

3.2 INSTALLATION

- A. Provide surge suppressor at each building service entrance and at other distribution and panelboard locations as indicated on the drawings. The SPD shall be located immediately adjacent to the switchboard or panelboard being protected (close-nipple to panel-boards). The SPD may not be located integral (switchgear manufacturer installed) within the switchboard or panelboard(s) unless the switchgear manufacturer providing such SPD products expressly meets or exceeds ALL parameters of this specification for the SPD. These SPDs shall be individually tested and Listed to ANSI/UL 1449-2006 according to their type and not be listed solely as part of the larger assembly. SPD devices not meeting or exceeding the performance of this specification will be deemed unacceptable.
- B. Do not energize or connect service entrance equipment and panelboards to their sources until TVSS devices are properly installed and connected.
- C. Do not perform insulation resistance tests of the distribution wiring equipment with the TVSS installed. Disconnect before conducting insulation resistance tests, and reconnect immediately after the testing is over.
- D. Install the SPD with #10 AWG minimum conductors to dedicated 30-amp breaker(s) in panel per manufacturer's installation instructions and close to the Neutral Bus. The dedicated breaker shall serve as a means of service disconnect for the SPD so that the electrical panel remains energized during SPD servicing. The installer may rearrange breaker locations to ensure the shortest and straightest leads to the SPD. If a dedicated breaker is not provided, an SPD with internal 30-amp fuse or a UL Listed fused disconnect switch shall be installed as a minimum. The conductors serving the SPD shall be twisted together (one twist per 12" of wire) to reduce

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the SPD system input impedance and shall be kept at the minimum length. The SPD shall be installed in strict accordance with the manufacturer's recommended practices and in compliance with N.E.C. requirements, State, and Local Codes.

- E. Lead lengths shall not exceed 18 inches.
- F. The electrical contractor shall verify the proper application of the SPD (i.e., voltage, phases, etc.). The electrical contractor shall ensure that all Neutral conductors are bonded to the system Ground at the service entrance or the serving isolation transformer prior to installation of the associated SPD. The electrical contractor will ensure that neutral-to-ground bonds do not exist at locations that are not service entrances or newly derived power sources.
- G. The electrical contractor shall furnish all labor, materials, equipment, and services necessary for and incidental to the installation of the SPD system components as specified herein.
- H. The electrical contractor shall coordinate with other electrical work as necessary to interface installation of the transient voltage surge suppression systems with other work on the site.
- I. The SPD installation shall be certified by a licensed electrician that the installation is in accordance with the manufacturer's recommendations, applicable electrical code requirements and the requirements of the specification above. Any deficiencies noted shall be corrected by the Contractor. Provide written documentation of this inspection as part of the closeout documentation.
- J. The Manufacturer or qualified representative shall inspect the final installation and conduct a four-hour scheduled familiarization and maintenance instruction with Administration and Maintenance personnel.

END OF SECTION 264313

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SECTION 265100 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Interior lighting fixtures, lamps, and ballasts.
 - 2. Emergency lighting units.
 - 3. Exit signs.
 - 4. Lighting fixture supports.
- B. Related Sections include the following:
 - 1. Division 26 Section "Wiring Devices" for manual wall-box.
 - 2. Division 26 Section "Lighting Controls and Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

- A. BF: Ballast factor.
- B. CRI: Color-rendering index.
- C. CU: Coefficient of utilization.
- D. HID: High-intensity discharge.
- E. LER: Luminaire efficacy rating.
- F. Luminaire: Complete lighting fixture, including ballast/driver housing if provided.
- G. RCR: Room cavity ratio.
- H. SSL: Solid State Lighting (LED)

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- I. BUG Rating: Backlight, Uplight, Glare Rating.

1.4 SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
1. Physical description of lighting fixture including dimensions.
 2. Emergency lighting units including battery and charger.
 3. Ballast.
 4. Energy-efficiency data.
 5. Life, output, and energy-efficiency data for lamps.
 6. Photometric data, in IESNA format, based on laboratory tests of each lighting fixture type, outfitted with lamps, ballasts, drivers, and accessories identical to those indicated for the lighting fixture as applied in this Project.
 - a. For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by the manufacturer.
 - b. Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program (NVLAP) for Energy Efficient Lighting Products.
- B. Shop Drawings: Show details of nonstandard or custom lighting fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories.
- C. Wiring Diagrams: Power and control wiring.
- D. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
1. Lighting fixtures.
 2. Suspended ceiling components.
 3. Structural members to which suspension systems for lighting fixtures will be attached.
 4. Other items in finished ceiling including the following:
 - a. Air outlets and inlets.
 - b. Speakers.
 - c. Sprinklers.
 - d. Smoke and fire detectors.
 - e. Occupancy sensors.
 - f. Access panels.
 - g. Perimeter moldings.
 5. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, signed by product manufacturer.
 6. Qualification Data: For agencies providing photometric data for lighting fixtures.
 7. Field quality-control test reports.
 8. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.

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9. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.
- C. 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.
- D. Comply with NFPA 70.
- E. FMG Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FMG.

1.6 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.7 WARRANTY

- A. Special Warranty for Emergency Lighting Batteries:
 - 1. Warranty Period for Self-Powered Exit Sign Batteries: 5 years from date of Substantial Completion. Full warranty shall apply for full 5 years, no prorated warranties are permitted.
- B. Special Warranty for Ballasts: Manufacturer's standard form in which ballast manufacturer agrees to repair or replace ballasts that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Electronic Ballasts: 5 years from date of Substantial Completion.
 - 2. Warranty Period for Electromagnetic Ballasts: 3 years from date of Substantial Completion.
 - 3. Warranty Period: Two year(s) from date of Substantial Completion.

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1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
 2. Plastic Diffusers and Lenses: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
 3. Battery and Charger Data: One for each emergency lighting unit.
 4. Ballasts: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
 5. Globes and Guards: 1 for every 20 of each type and rating installed. Furnish at least one of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
- B. In Interior Lighting Fixture Schedule where titles below are column or row headings that 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. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 3. Basis-of-Design Product: The design for each lighting fixture is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. LED Fixtures: Comply with UL 8750. Test according to Illuminating Engineering Society of North America (IESNA) LM-80 standards.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.

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- E. 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.

- F. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
 - 4. Laminated Silver Metalized Film: 90 percent.

- G. Plastic Diffusers, Covers, and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least 0.125 inch minimum unless different thickness is indicated.
 - b. UV stabilized.

- H. Electromagnetic-Interference Filters: Factory installed to suppress conducted electromagnetic-interference as required by MIL-STD-461E. Fabricate lighting fixtures with one filter on each ballast indicated to require a filter.

2.3 LED TROFFERS

- A. Description: Led lighting fixtures shall have long life replaceable LEDs (where applicable) coupled with high-efficiency drivers, provide superior quality and quality of illumination for extended service life. Fixture shall be rated to deliver specified performance for 50,000 hours.

- B. Fixtures noted to be dimmable shall have 0-10-volt control. COORDINATE with dimming system.

- C. Fixtures shall provide (degree) K color temperatures as indicated on drawings.

- D. Fixtures shall have a minimum of 5-year warranty

- E. LM-79-08, IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

- F. LM-80-08, IESNA Approved Method for Measuring Lumen Maintenance of LED Light Sources

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2.4 EMERGENCY LIGHTING UNITS

- A. Description: Self-contained units complying with UL 924.
1. Battery: Sealed, maintenance-free, lead-acid type.
 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 3. 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.
 4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 6. Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures.
 7. Integral Time-Delay Relay: Holds unit on for fixed interval of 15 minutes when power is restored after an outage.
 8. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
 9. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.

2.5 EXIT SIGNS

- A. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

2.6 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 26 Section "Electrical Supports" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.

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- E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage.
- F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

2.7 REQUIREMENTS FOR INDIVIDUAL LIGHTING FIXTURES

- A. Comply with requirements of Lighting Fixture Schedule on electrical drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. Support for Lighting Fixtures in or on Grid-Type Suspended Ceilings: Use grid as a support element.
 - 1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from lighting fixture corners.
 - 2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 - 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
 - 4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
- C. Suspended Lighting Fixture Support:
 - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 - 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
- D. Adjust aimable lighting fixtures to provide required light intensities.
- E. Connect wiring according to Division 26 Section "Conductors and Cables."

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3.2 FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

- B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 265100

BID DOCUMENTS

DESTIN FORT WALTON BEACH CONVENTION CENTER HVAC UPGRADES & RESTROOM RENOVATIONS

1250 MIRACLE STRIP PKWY SE FORT WALTON BEACH, FL 32548



ARTISTIC RENDERINGS, AERIAL IMAGES AND AXONOMETRICS ARE PROVIDED FOR PROJECT ORIENTATION ONLY. RENDERINGS, AERIAL IMAGES AND AXONOMETRICS ARE NOT TO SCALE AND DO NOT NECESSARILY ACCURATELY REFLECT ALL PROVISIONS OF THE CONTRACT DOCUMENTS.

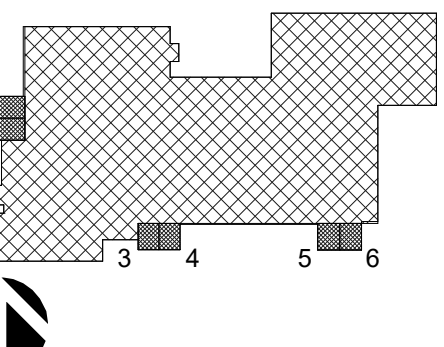


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PURSUANT TO FLORIDA STATUTES, SECTION 559.0035, AN INDIVIDUAL EMPLOYEE OR AGENT MAY NOT BE HELD INDIVIDUALLY LIABLE FOR NEGLIGENCE.

BID DOCUMENTS

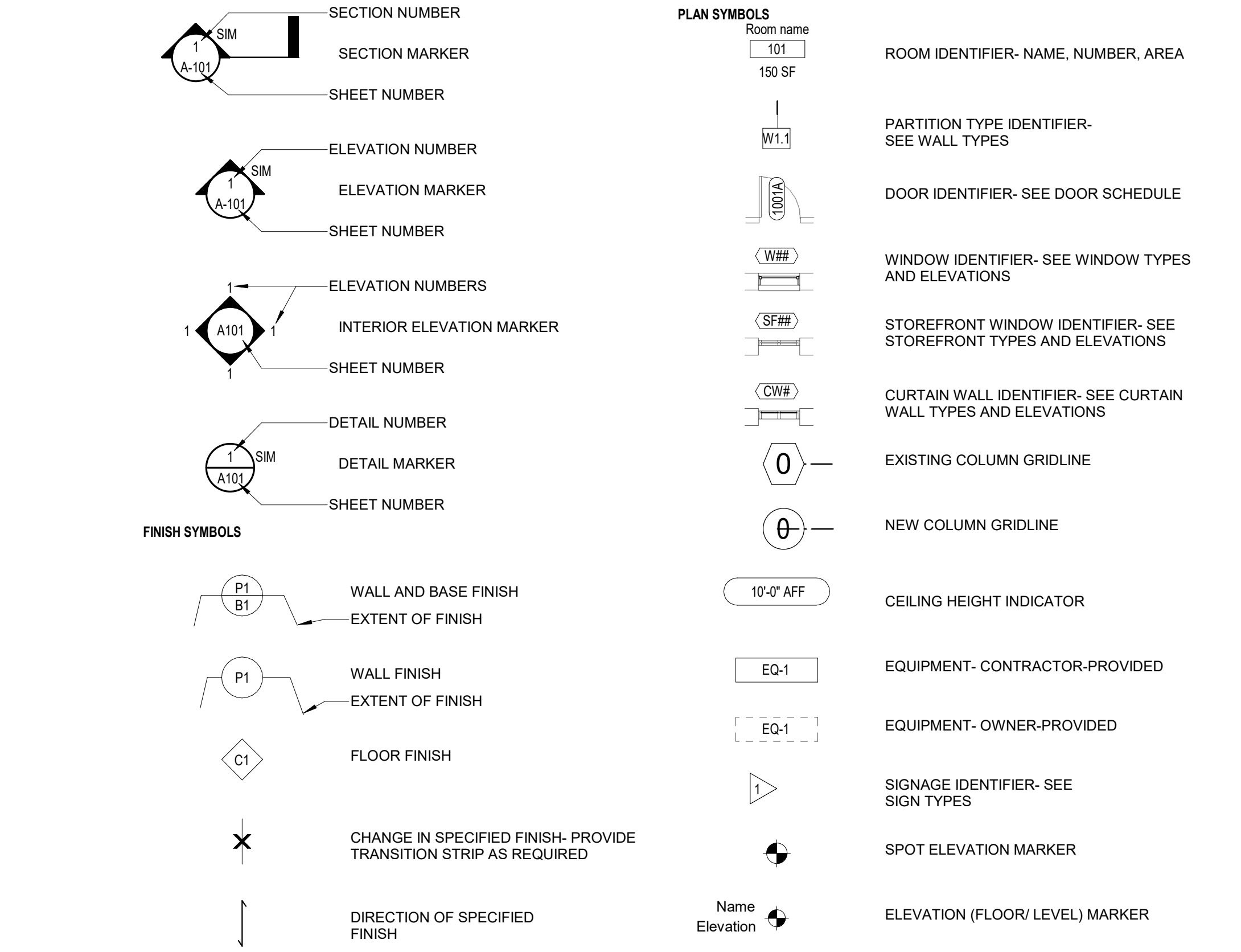
DESTIN FORT WALTON BEACH CONVENTION CENTER
HVAC UPGRADES & RESTROOM RENOVATIONS
TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
1250 MIRACLE STRIP PKWY SE
FORT WALTON BEACH, FL 32548



PROJECT SCOPE

FULL PROJECT SCOPE INCLUDED IN THE SPECIFICATIONS.

STANDARD SYMBOLS



STANDARD ABBREVIATIONS

AC	AIR CONDITIONED	FT	FOOT, FEET	PLYWD	PLYWOOD
AD	AREA DRAIN	FTG	FOOTING	PNL	PANEL
AF	ABOVE FINISHED FLOOR	GA	GALVANIZED	PRESS.	PRESSURE
AHJ	AIR HANDLING UNIT	GAL	GALLON	PSF	POUNDS/SQUARE FOOT
ALT	ALTERNATE	GALV	GALVANIZED	PSI	POUNDS/SQUARE INCH
ALUM	ALUMINUM	GEJ	GUTTER EXPANSION JOINT	PSIG	POUNDS/SQUARE INCH-GAGE
AMP, A	AMPERES	GFE	GROUND FURNISHED EQUIP	PT	POINT
AO	ACCESS OPENING	GL	GLASS	PTD	PAINTED
APPROX	APPROXIMATELY	GMS	GALVANIZED METAL STUD	QTR	QUARTER
ARCH	ARCHITECTURAL	GND	GROUND	QUAN	QUANTITY
A.T.	ASPHALT TILE	GOVT	GOVERNMENT	R	RISER
ATC	ACOUSTIC TILE CEILING	GPH	GALLONS/HOUR	RA	RETURN AIR
BAL	BALANCE	GPM	GALLONS/MINUTE	RAD	RADIUS
BD	BOARD	GR	GRILLE	RAL	RIVERBANK ACOUSTICAL LABORATORIES
BLDG	BUILDING	GR	GRILLE	RD	ROUND
BLK	BLANK	GWB	GYPSUM WALLBOARD	REG	REGISTER
BM	BEAM	HB	HOSE BIB	REF	REINFORCING
BOT	BOTTOM	HC	HOLLOW CORE	REQ	REQUIRED
BRG	BEARING	HT	HEIGHT	RET	RETURN
BTUH	BRITISH THERMO UNIT/HOUR	HORIZ	HORIZONTAL	RG	RETURN GRILLE
CAB	CABINET	HM	HOLLOW METAL	RM	ROOM
CAP	CAPACITY	HP	HORSEPOWER	RPM	REVOLUTIONS/MINUTE
C/B	CIRCUIT BREAKER	HR	HOUR	S	SUPPLY
CD	CEILING DIFFUSER	HTG	HEATING	SA	SUPPLY AIR
CEM	CEMENT	HTR	HEATER	SCH	SCHEDULE
CER	CERAMIC	H&V	HEATING AND VENTILATING	SCHED	SCHEDULE
CFM	CUBIC FEET/MINUTE	HW	HARDWARE	SECT	SECTION
CIRCT	CIRCUIT	HYD	HYDRANT	SERV	SERVICE
CL	CENTERLINE	ID	INSIDE DIAMETER	SHT	SHEET
CEL	CEILING	IE	INVERT ELEVATION	SJ	SAWED JOINT
CLG	CORNER GUARD	IC	IMPACT INSULATION CLASS	SPEC	SPECIFICATIONS
CL	CLOSET	IN	INCHES	SO FT	SQUARE FEET
CL	CEILING	IN	INCHES	ST	STEEL
CLR	CLEAR	INCD	INCANDESCENT	STC	SOUND TRANSMISSION CLASS
CMU	CONCRETE MASONRY UNIT	INSUL	INSULATION	STRUC	STRUCTURE
CO	CLEANOUT	INT	INTERIOR	SUSP	SUSPENDED
COL	COLUMN	JB	JUNCTION BOX	SW	SWITCH
CONC	CONCRETE	JCT	JOINT	T	TOILET
COND	CONDENSATE	KB	KNOX BOX	TEL	TELEPHONE
CONN	CONNECTION	KVA	KILOVOLT AMPERE	TEMP	TEMPERATURE
CONST	CONSTRUCTION	LB #	POUND	THK	THICKNESS
CONT	CONTINUOUS	LG	LONG	THD	THREAD
CONTR JT	CONSTRUCTION JOINT	LLV	LONG LEG VERTICAL	TOC	TOP OF CONCRETE
CSC	COLOR SYMBOL CODE	LTG	LIGHTING PANEL	TOP	TOP OF FOOTING
CT	CERAMIC TILE	LTG	LIGHTING	TOIL	TOILET
CTB	CERAMIC TILE BASE	M	MOTOR	TYP	TYPICAL
CTOC	CENTER TO CENTER	MAINT	MAINTENANCE	UL	UNDERWRITER LABORATORIES
DET	DETAIL	MAX	MAXIMUM	VOL	VOLTA
DIA	DIAMETER	MDP	MAIN DISTRIBUTION PANEL	VAT	VINYL ASBESTOS TILE
DIFF	DIFFUSER	MECH	MECHANICAL	VENT	VENTILATION
DIM	DIMENSION	MTL	METAL	VERT	VERTICAL
DISC	DISCONNECT	MIN	MINIMUM	VTR	VENT THROUGH ROOF
DJ	DUMMY JOINT	MISC	MISCELLANEOUS	W	WATT
DN	DOWN	MO	MASONRY OPENING	W/	WITH
DR	DRAIN	MT	METAL THRESHOLD	WC	WAINSCOTING
DS	DOWNSPOUT	MTD	MOUNTED	WD	WOOD
DWG(S)	DRAWING(S)	MTS	MOUNTING	W.D.	WINDOW DIMENSION
EA	EACH	MV	MECHANICAL VENTILATION	WF	WIDE FLANGE
EF	EACH FACE	MGT	MATTE GLAZE TILE	WG	WEATHER GAGE
EJC	EXPANSION JOINT COVER	NA	NOT APPLICABLE	WP	WEATHERPROOF
ELEC	ELECTRIC	NIC	NOT IN CONTRACT	WTR	WATER
EQUIP	EQUIPMENT	NO	NUMBER	WWF	WELDED WIRE FABRIC
EW	EACH WAY	NRC	NOISE REDUCTION COEFFICIENT	XC	EXPANSION CONTROL
EWC	ELECTRIC WATER COOLER	OA	OUTDOOR AIR		
EXH	EXHAUST	OC	ON CENTER		
EXP JT	EXPANSION JOINT	OD	OVERLOAD		
EXT	EXTERIOR	OPNG	OPENING		
EXIST	EXISTING	OPP	OPPOSITE		
FA	FIRE ALARM	OSD	OPEN SIGHT DRAIN		
FC	FLEXIBLE CONNECTION	P	PAPER		
FD	FLOOR DRAIN	PART.	PARTITION		
FE	FIRE EXTINGUISHER AND BRACKET	PER	PERIMETER		
FEC	FIRE EXTINGUISHER AND CABINET	PJF	PREFORMED JOINT FILLER		
FIN	FINISH	PL	PLATE		
FL	FLOOR	PLBG	PLUMBING		

PROJECT TEAM	
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ELECTRICAL:	HUMBER GARICK 142 EGLIN PARKWAY, S.E. FORT WALTON BEACH, FL 32548 CONTACT NAME: DAN WHITE, P.E. PHONE # 850.243.6723

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D101.2	ENLARGED DEMO RCP
MECHANICAL	
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A022	UL ASSEMBLIES
ARCHITECTURAL	
A100	ARCHITECTURE SITE PLAN
A101	OVERALL FIRST FLOOR PLAN
A102	OVERALL ROOF PLAN
A400	INTERIOR FINISH LEGEND
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E 400	PANEL AND MECHANICAL SCHEDULE
ED 200	ELECTRICAL DEMOLITION - RESTROOMS

LOCATION MAP



REVISIONS:

No.	Description	Date

Project number **1757.8**
 Dated **04-12-21**
 PIC Approver
 PM Designer

G000

Scale As indicated

GENERAL NOTES:

- THE LIMIT OF WORK IN THESE CONTRACT DOCUMENTS IS 5'-0" FROM THE BUILDING PERIMETER OR UNLESS OTHERWISE SPECIFICALLY NOTED.
- CONTRACTOR SHALL PREPARE EXISTING SURFACES TO RECEIVE NEW WORK AND/OR SHALL PATCH AND REPAIR SURFACES DAMAGED DURING REMOVAL OR INSTALLATION OF THE WORK INDICATED. DAMAGED SURFACES SHALL BE REPAIRED TO MATCH THE EXISTING ADJACENT SURFACES. WHERE REMOVAL OF EXISTING ITEMS CREATES SHALL PATCH AND REPAIR TO BE FLUSH WITH EXISTING.
- DAG ARCHITECTS DID NOT PERFORM A COMPREHENSIVE FIELD SURVEY AND IS NOT TO BE HELD ACCOUNTABLE FOR INACCURATE DIMENSIONS OR HIDDEN CONDITIONS. ALL DIMENSIONS OF EXISTING CONDITIONS ARE TO FINISHED SURFACES. WHERE HAND MEASURED AND MAY HAVE BEEN OBTAINED FROM ARCHITECTURAL DRAWINGS OR PHOTOGRAPHS SHALL PROVIDE WRITTEN PROOF OF INSURANCE PRIOR TO NOTICE TO PROCEED. THE REPRESENTATION OF HIDDEN CONDITIONS IS BASED UPON DAG ARCHITECTS KNOWLEDGE OF TYPICAL CONSTRUCTION PRACTICES AND SHOULD BE VERIFIED BY THE CONTRACTOR.
- THE CONTRACTOR IS TO FIELD VERIFY ALL EXISTING CONDITIONS TO INCLUDE DIMENSIONS, ELEVATIONS, COMPONENTS AND ASSEMBLIES PRIOR TO COMMENCING WORK. CONTRACTOR'S INVESTMENTS DUE TO FAILURE TO VERIFY NON-HIDDEN CONDITIONS WILL NOT BE ACCEPTED.
- CONTRACTOR SHALL MAINTAIN FREE AND UNOBSTRUCTED ACCESS TO AND EGRESS FROM THE AREA OF WORK.
- CONTRACTOR SHALL CLEAN AND REMOVE DEBRIS ON A DAILY BASIS.
- GENERAL CONTRACTOR SHALL COORDINATE ALL PORTIONS OF THE WORK AND MAINTAIN A QUALIFIED SUPERINTENDENT FULL-TIME WHEN WORK IS TO BE PERFORMED ON SITE AT ALL TIMES. NO EXCEPTIONS.
- THE LOCATIONS OF KNOWN UNDERGROUND UTILITIES ARE SHOWN IN RED ON THIS SHEET. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

- GENERAL CONTRACTOR SHALL MAINTAIN RECORD DRAWINGS ON SITE DURING CONSTRUCTION THAT SHOW AS-BUILT CONDITIONS OF ALL WORK INCLUDING PIPING, ELECTRICAL RUNS, DIMENSIONS, DISCOVERED ITEMS, DEMOLITION, ETC. THESE RECORD DRAWINGS SHALL BE PROVIDED TO THE ARCHITECT PRIOR TO SUBSTANTIAL COMPLETION.
- ANY DEVIATIONS IN THE WORK SHALL BE COORDINATED BETWEEN OWNER AND ARCHITECT PRIOR TO WORK PERFORMED. IF IT DOES NOT MEET APPROVAL OF OWNER, THE CONTRACTOR SHALL BEAR ALL COSTS ASSOCIATED IN CORRECTING THE WORK AT NO EXPENSE TO THE OWNER.
- CONTRACTOR SHALL PROVIDE ALL LABOR, TOOLS & EQUIPMENT NECESSARY WHETHER INDICATED OR REQUIRED TO PROVIDE THE OWNER WITH A COMPLETE PROJECT READY FOR USE.
- CONTRACTORS SHALL FOLLOW ALL FEDERAL, STATE AND LOCAL CODES AND REGULATIONS. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDE WRITTEN PROOF OF INSURANCE PRIOR TO NOTICE TO PROCEED.
- GENERAL CONTRACTOR SHALL WARRANTY ALL PORTIONS OF THE WORK ONE YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION. GENERAL CONTRACTOR SHALL ACQUIRE ALL WARRANTIES FROM ALL TRADES AND SUBMIT FOR SUBSTANTIAL COMPLETION.
- ALL DIMENSIONS FOR NEW CONSTRUCTION ARE TO FACE OF STUD, TO FACE OF CMU AND TO CENTER LINE OF COLUMN.
- GENERAL CONTRACTOR SHALL COORDINATE SITE ACCESS AND SCHEDULE WITH THE OWNER IN ORDER TO MINIMIZE DISRUPTION OF THE OWNERS ACCESS TO THE FACILITIES.
- PROJECT KEYNOTES ARE SHEET SPECIFIC. EACH KEYNOTE IS FOR THAT PARTICULAR SHEET ONLY. IF SAME KEYNOTES ARE USED ON DIFFERENT SHEETS, THIS IS FOR EASE OF COMMUNICATION, BUT DOES NOT PRECLUDE OR OVERRIDE EACH INDIVIDUAL SHEET'S KEYNOTES.
- CONTRACTOR SHALL COORDINATE ALL PORTIONS OF THE WORK

- CONTRACTOR SHALL LIMIT REMOVAL AND DEMOLITION WORK TO THAT SPECIFICALLY REQUIRED FOR THE INSTALLATION OF NEW WORK. DEMOLITION SHALL BE LIMITED TO THE MINIMUM NECESSARY TO PREVENT ANY DAMAGE TO THE EXISTING SITE SHALL BE FULLY REPAIRED AND RESTORED TO MATCH THE ORIGINAL CONSTRUCTION AT NO COST TO THE OWNER. COORDINATE WORK WITH ALL DISCIPLINES INVOLVED PRIOR TO COMMENCEMENT.
- CONTRACTOR SHALL REPAIR ALL VOIDS, OPENINGS OR HOLES IN EXISTING SUBSTRATES THAT RESULT FROM THE REMOVAL OF EXISTING EQUIPMENT, FIXTURES, DEVICES, PIPING AND SIMILAR ITEMS. CONTRACTOR SHALL USE SIMILAR MATERIALS, EQUAL IN QUALITY TO THE AREAS BEING REPAIRED.
- WHERE CONSTRUCTION AROUND EXISTING WALLS HAS BEEN DISTURBED EITHER PARTIAL OR COMPLETE, THE CONTRACTOR SHALL REPAIR TO ORIGINAL FINISHES. CONTRACTOR SHALL REPAIR THE EXISTING ADJACENT WALL SURFACE USING SIMILAR MATERIALS EQUAL IN QUALITY TO THE AREAS BEING REPAIRED.
- MECHANICAL AND ELECTRICAL RUNS DISCOVERED WITHIN A DEMOLISHED WALL, YET NOT INDICATED ON THE CONTRACT DOCUMENTS AS TO THEIR ROUTING, CAPPING, ETC., SHALL BE REPAIRED TO ORIGINAL FINISHES. CONTRACTOR SHALL BE CONTACTED FOR FURTHER CLARIFICATION.
- CONTRACTOR SHALL REPAIR ALL VOIDS, OPENINGS OR HOLES IN EXISTING SUBSTRATES AND/OR EXISTING EXTERIOR ENVELOPE THAT RESULT FROM THE REMOVAL OF EXISTING EQUIPMENT, FIXTURES, DEVICES, PIPING AND SIMILAR MATERIALS, EQUAL IN QUALITY TO THE AREAS BEING REPAIRED.
- CONTRACTOR SHALL BRACE ALL WALLS, ROOFS, AND FLOORING TO PREVENT COLLAPSE.
- THE OWNER IS TO HAVE FIRST RIGHT OF REFUSAL ON ALL MATERIALS ASSEMBLIES, EQUIPMENT, FIXTURES, APPURTENANCES, ETC. THAT ARE REMOVED FROM THE PROJECT SITE. CONTRACTOR IS TO EXERCISE ALL DUE CARE TO REMOVE ITEMS DESIGNATED BY OWNER IN A MANNER TO MINIMIZE DAMAGE TO ITEMS.
- CONTRACTOR IS TO NOTIFY ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL EXISTING CONDITIONS.

- CG TO NOTIFY ARCHITECT UPON COMPLETION OF DEMOLITION, BEFORE BEGINNING RENOVATION, FOR OBSERVATION OF PREVIOUSLY HIDDEN CONDITIONS.
- ANY EXISTING PENETRATIONS OF THE BUILDING WEATHER ENVELOPE THAT ARE TO BE ABANDONED ARE TO BE CAULKED, SEALED, FLASHED, OR OTHERWISE MADE WEATHERTIGHT IN A MANNER THAT MATCHES THE EXISTING ASSEMBLY AND TO MATCH EXISTING SYSTEMS.
- ANY NEW PENETRATIONS OF THE BUILDING WEATHER ENVELOPE ARE TO BE CAULKED, SEALED, FLASHED, OR OTHERWISE MADE WEATHERTIGHT IN A MANNER COMPATIBLE TO THE EXISTING ASSEMBLY AND TO MATCH EXISTING SYSTEMS.
- THE REPRESENTATION OF EXISTING BUILDING CONDITIONS IS PRIMARILY BASED ON PLANS PROVIDED BY OWNER AND ON DAG ARCHITECTS SITE VISIT OBSERVATIONS.
- DAG ARCHITECTS DID NOT PERFORM A COMPREHENSIVE FIELD SURVEY AND IS NOT TO BE HELD ACCOUNTABLE FOR INACCURATE DIMENSIONS OR HIDDEN CONDITIONS. ALL DIMENSIONS OF EXISTING CONDITIONS ARE TO FINISHED SURFACES, WHERE HAND MEASURED AND MAY HAVE BEEN OBTAINED FROM ARCHITECTURAL DRAWINGS OR PHOTOGRAPHS. THE REPRESENTATION OF HIDDEN CONDITIONS IS BASED UPON DAG ARCHITECTS KNOWLEDGE OF TYPICAL CONSTRUCTION PRACTICES AND SHOULD BE VERIFIED BY THE CONTRACTOR.

- FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO COMMENCEMENT OF WORK. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT ANY AND ALL ITEMS WHICH ARE TO REMAIN OR TO BE ALTERED.
- CONSTRUCTION DRAWINGS ARE NOT ALL INCLUSIVE OF ALL ITEMS THAT MAY BE REMOVED IN THE COURSE OF THE PROJECT. THE A/E RESERVES THE RIGHT TO INCLUDE ADDITIONAL DEMOLITION NOTES DISCOVERED DURING CONSTRUCTION.
- RESTROOMS IN AREA OF WORK TO BE FULLY DEMOLISHED TO BE REMOVED TO SUBSTRATE. TYPICAL FINISHES TO BE REMOVED TO SUBSTRATE. TYPICAL FINISHES TO REMAIN AND FIRE PROTECTION SYSTEMS AND/OR FIXTURES TO REMAIN SHALL BE INDICATED ON THE DRAWINGS. ANY ELEMENTS IN ARCHITECTURAL DRAWINGS NOT TO BE REMOVED WHERE POSSIBLE. ANY INDICATION OF CONFLICT WITH OTHER CONTRACTORS SHALL BE REPORTED IMMEDIATELY TO THE ARCHITECT FOR RESOLUTION. THE CONTRACTOR IS RESPONSIBLE FOR BRINGING DISCREPANCIES TO THE ARCHITECT'S ATTENTION IMMEDIATELY UPON DISCOVERY. WORK IN THAT AREA FOR CLARIFICATION OF DESIGN INTENT.

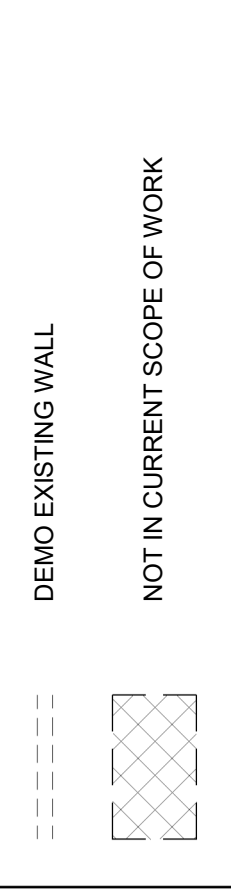
GENERAL DEMO NOTES

DAG

CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO COMMENCEMENT OF WORK. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT ANY AND ALL ITEMS WHICH ARE TO REMAIN OR TO BE ALTERED. CONSTRUCTION DRAWINGS ARE NOT ALL INCLUSIVE OF ALL ITEMS THAT MAY BE REMOVED IN THE COURSE OF THE PROJECT. THE A/E RESERVES THE RIGHT TO INCLUDE ADDITIONAL DEMOLITION NOTES DISCOVERED DURING CONSTRUCTION. RESTROOMS IN AREA OF WORK TO BE FULLY DEMOLISHED TO BE REMOVED TO SUBSTRATE. TYPICAL FINISHES TO BE REMOVED TO SUBSTRATE. TYPICAL FINISHES TO REMAIN AND FIRE PROTECTION SYSTEMS AND/OR FIXTURES TO REMAIN SHALL BE INDICATED ON THE DRAWINGS. ANY ELEMENTS IN ARCHITECTURAL DRAWINGS NOT TO BE REMOVED WHERE POSSIBLE. ANY INDICATION OF CONFLICT WITH OTHER CONTRACTORS SHALL BE REPORTED IMMEDIATELY TO THE ARCHITECT FOR RESOLUTION. THE CONTRACTOR IS RESPONSIBLE FOR BRINGING DISCREPANCIES TO THE ARCHITECT'S ATTENTION IMMEDIATELY UPON DISCOVERY. WORK IN THAT AREA FOR CLARIFICATION OF DESIGN INTENT.

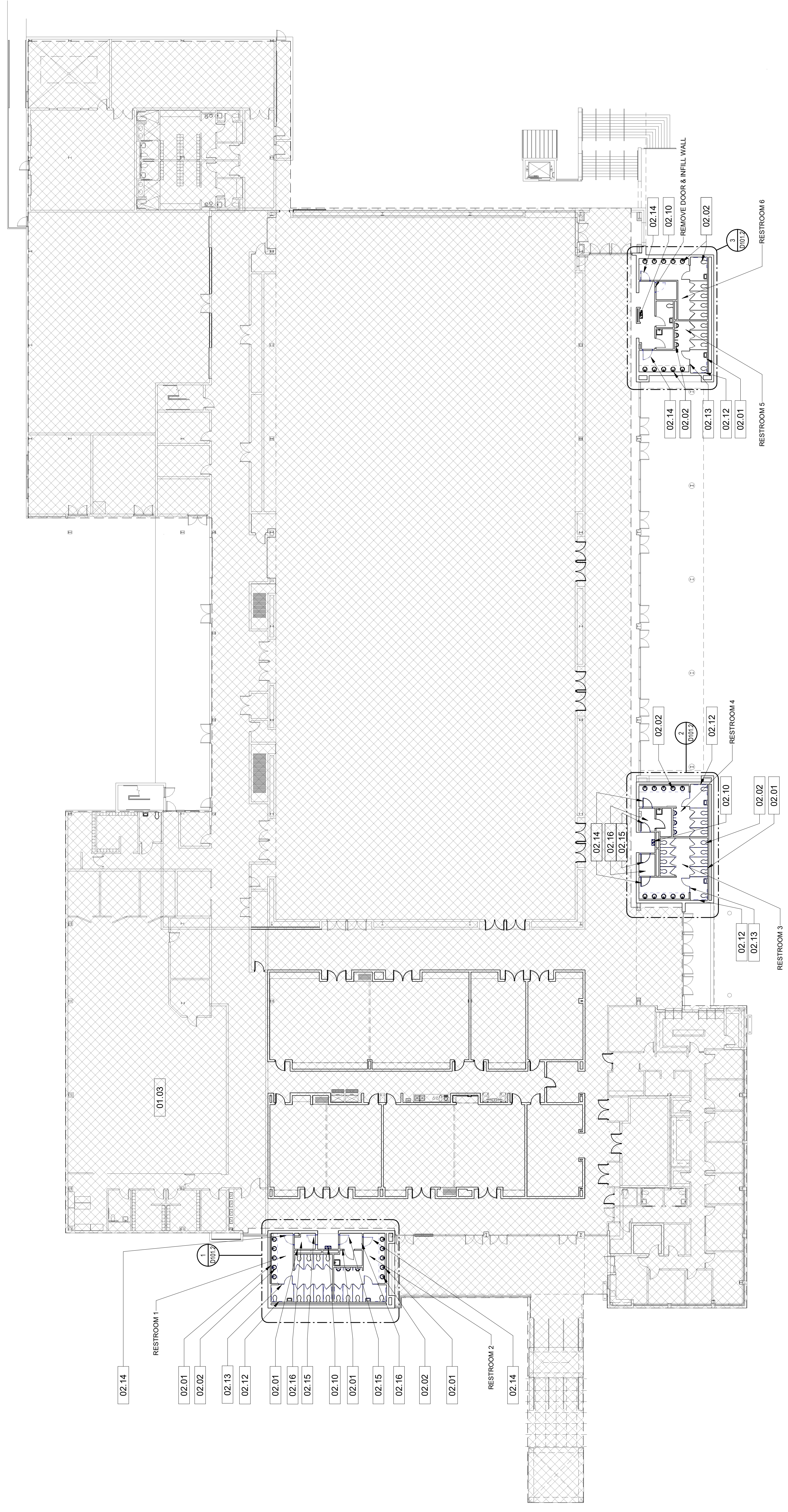
BID DOCUMENTS

LEGEND



KEYNOTES

NUMBER	DESCRIPTION
01.03	NOT PART OF THIS RENOVATION PHASE
02.01	REMOVE EXISTING TILE TO SUBSTRATE & DISCARD. METAL STUDS/FRAMING TO BE REMOVED/REPLACED.
02.02	REMOVE AND REPLACE EXISTING PLUMBING FIXTURES, SINKS, TUBS, TOILETS, SINKS & REPAIRS.
02.10	BOTTLE-FILLER NOT REQUESTED.
02.12	REMOVE & REPLACE EXISTING TOILET ACCESSORIES
02.13	REMOVE & REPLACE EXISTING RESTROOM PARTITIONS
02.14	PROTECT EXISTING FRAME, REFINISH AND PAINT DOORS AND FRAMES - SW/019 GAUNTLLET GRAY.
02.15	REMOVE EXISTING FLOORING TO SUBSTRATE IN ITS ENTIRETY AND DISCARD.
02.16	REMOVE EXISTING FLOORING TO SUBSTRATE IN ITS ENTIRETY AND DISCARD.



1 OVERALL EXHIBIT LEVEL DEMOLITION PLAN
 SCALE: 1/16" = 1'-0"

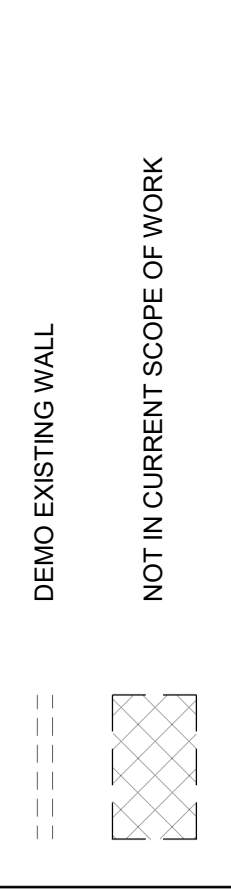
DAG

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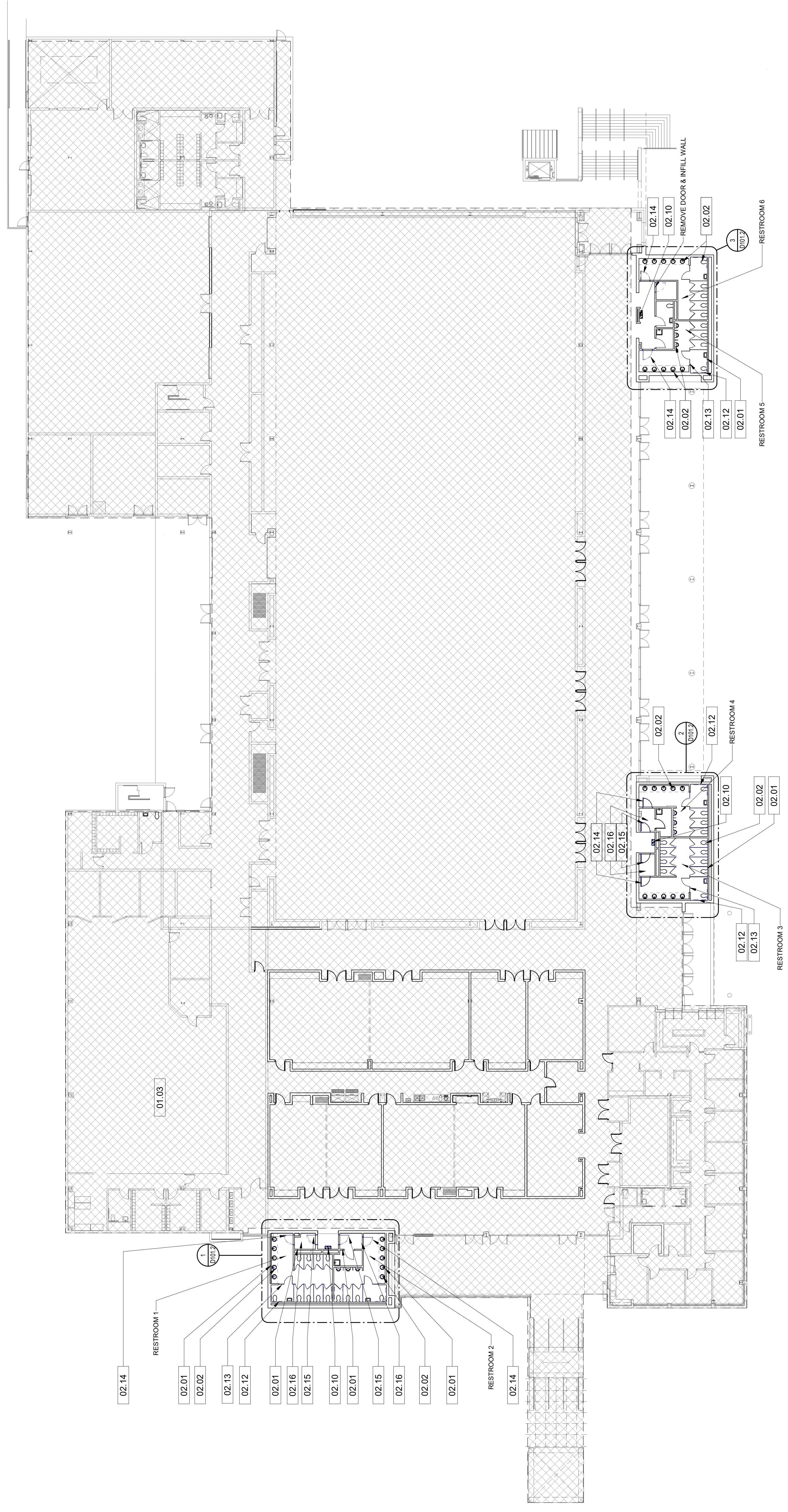
BID DOCUMENTS

LEGEND



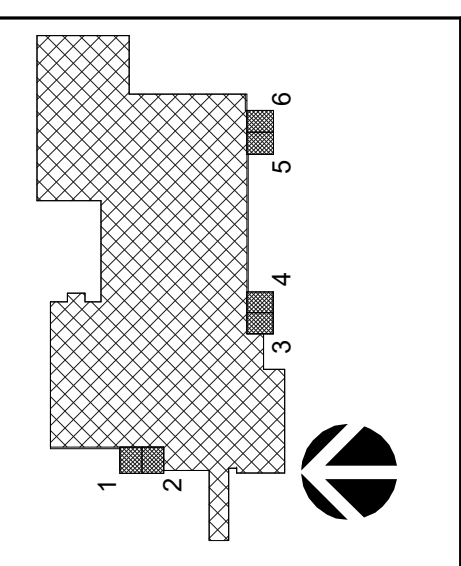
KEYNOTES

NUMBER	DESCRIPTION
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02.02	REMOVE AND REPLACE EXISTING PLUMBING FIXTURES, SINKS, TUBS, TOILETS, SINKS & REPAIRS.
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1 OVERALL EXHIBIT LEVEL DEMOLITION PLAN
 SCALE: 1/16" = 1'-0"

DESTIN FORT WALTON BEACH CONVENTION CENTER
HVAC UPGRADES & RESTROOM RENOVATIONS
 TASK ORDER NO. 8 & NO. 5 - C18-2638-TD
 1260 MIRACLE STRIP PKWY SE
 FORT WALTON BEACH, FL 32548



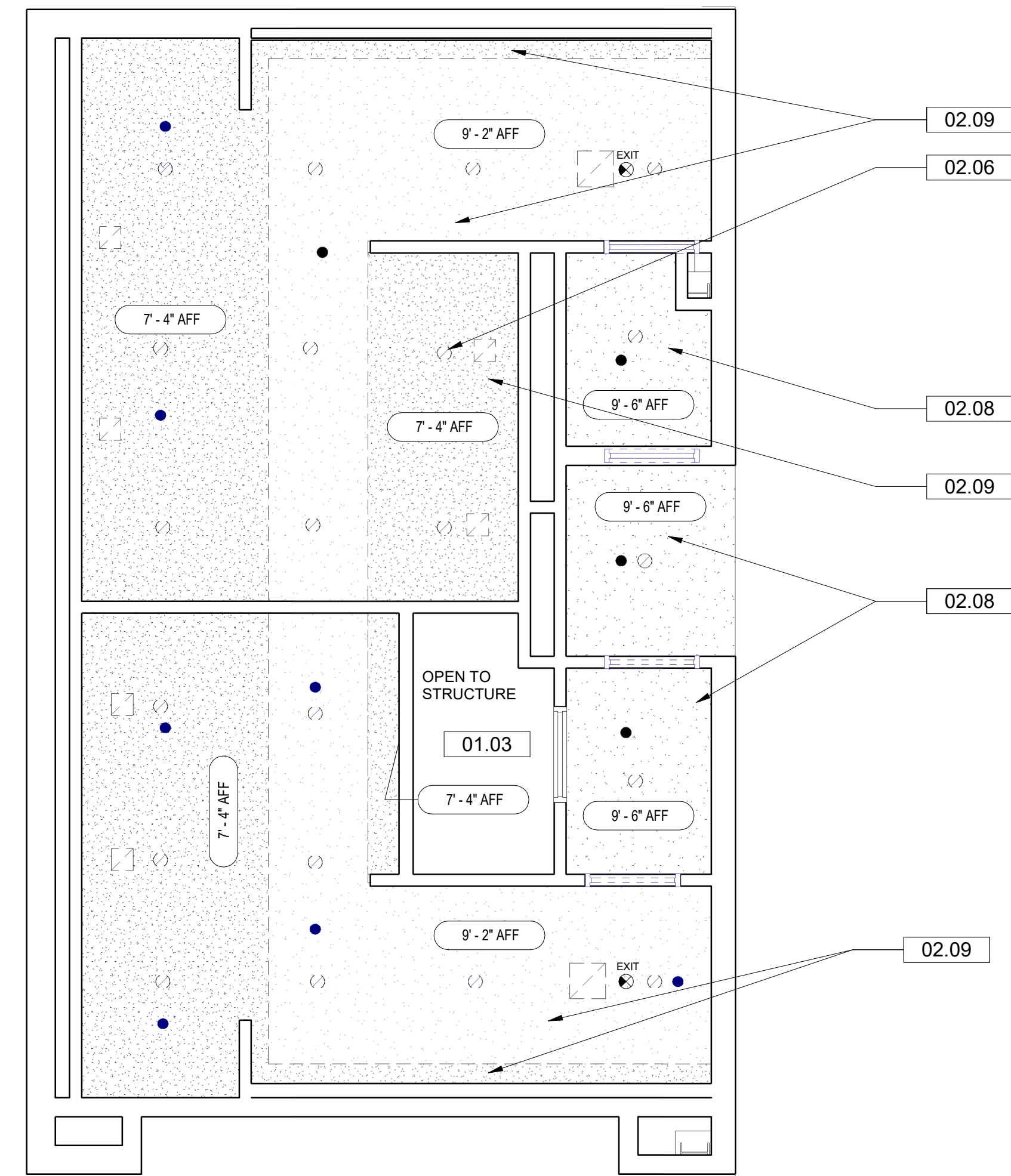
REVISIONS:

No.	Description	Date

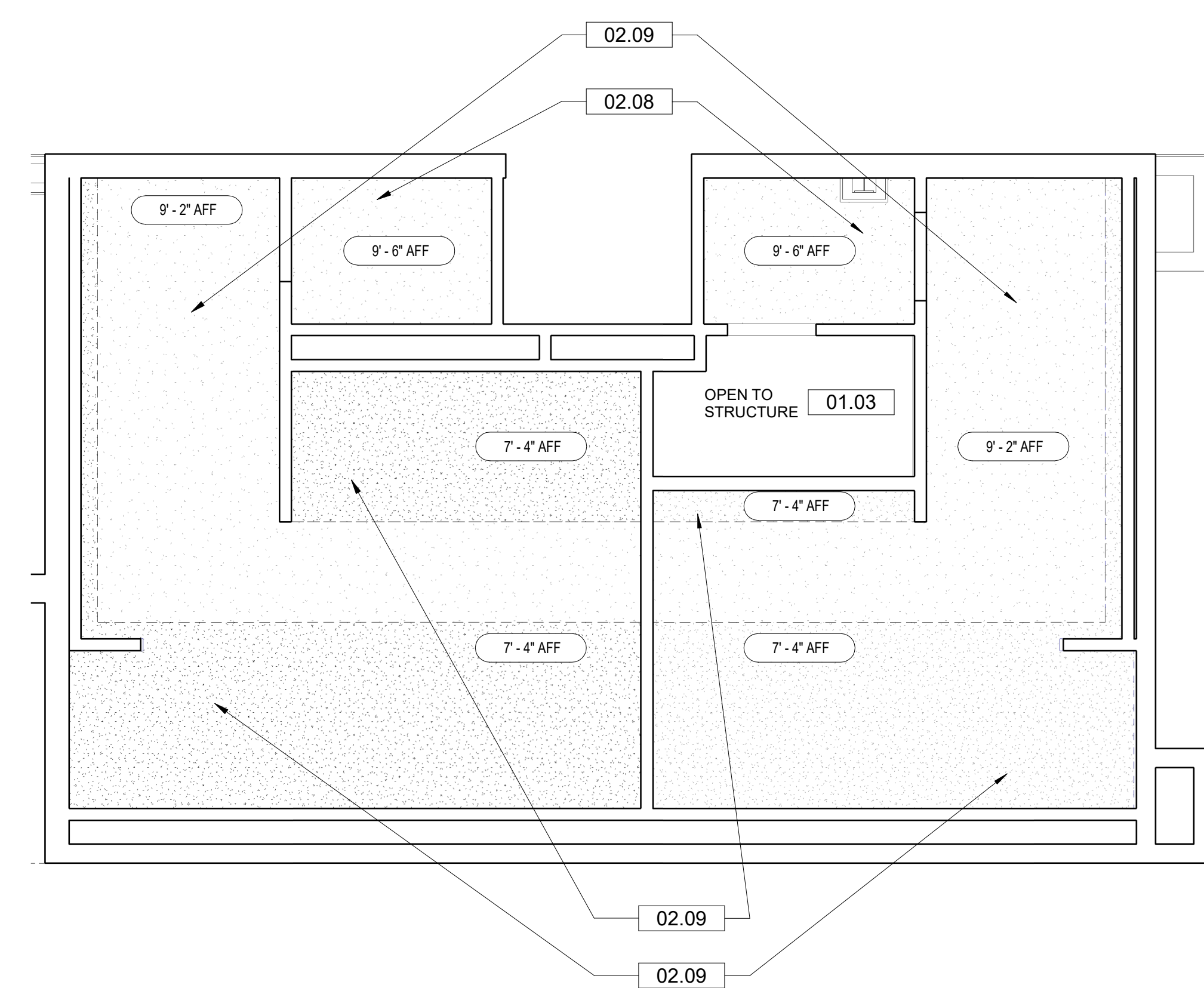
DEMO PLAN - OVERALL

Project number	17057.8
Date	04-12-21
PIC	Approver
PM	Designer

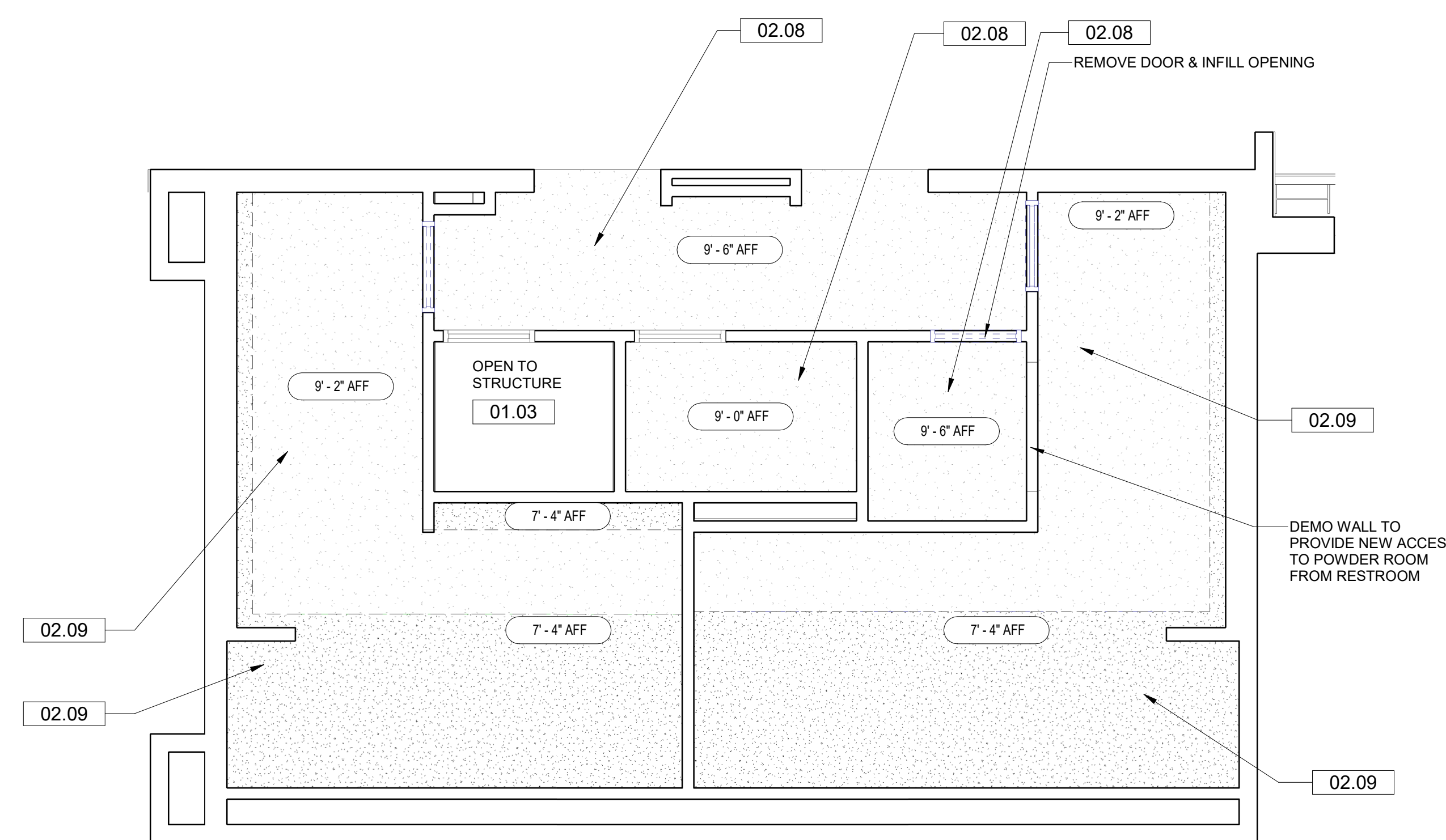
D101.1
 Scale: As Indicated



1 EXHIBIT LEVEL DEMO RCP - RR 1 & 2
SCALE: 1/4" = 1'-0"



2 EXHIBIT LEVEL DEMO RCP - RR 3 & 4
SCALE: 1/4" = 1'-0"



3 EXHIBIT LEVEL DEMO RCP - RR 5 & 6
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO PERFORMING ANY DEMOLITION OR NEW CONSTRUCTION. PROTECT ANY AND ALL ITEMS WHICH ARE TO REMAIN OR TO BE ALTERED.
2. THE DEMOLITION DRAWINGS ARE NOT ALL INCLUSIVE OF ALL ITEMS THAT MAY BE REMOVED IN THE COURSE OF THE PROJECT. THE A/E RESERVES THE RIGHT TO INCLUDE ADDITIONAL DEMOLITION NOTES DISCOVERED DURING CONSTRUCTION.
3. ALL RESTROOMS IN AREA OF WORK TO BE FULLY RENOVATED WITH ALL FLOOR, WALL, AND CEILING FINISHES TO BE REMOVED TO SUBSTRATE, TYPICAL.
4. ALL MEP AND FIRE PROTECTION SYSTEMS AND/OR FIXTURES TO BE EVALUATED BY A LICENSED ENGINEER AND UPGRADED WHERE NECESSARY. ANY INDICATION OF ELEMENTS IN ARCHITECTURAL DRAWINGS DIAGRAMMATICALLY REFLECT AN AESTHETIC INTENT, BUT SHOULD BE COORDINATED WITH MEP AND FIRE PROTECTION DRAWINGS FOR FULL EXTENT OF CONSULTANT WORK AT ANY POINT, WHERE DRAWINGS OF ONE SPECIALTY CONFLICT WITH ANOTHER, THE CONTRACTOR IS RESPONSIBLE FOR BRINGING DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT PRIOR TO THE START OF WORK IN THAT AREA FOR CLARIFICATION OF DESIGN INTENT.

DEMOLITION RCP LEGEND

- DEMOLISH EXISTING LIGHT FIXTURES, SEE ELECTRICAL.
- DEMOLISH EXISTING MECHANICAL DEVICES, SEE MECHANICAL.
- DEMOLISH EXISTING GYPSUM BOARD CEILING, UNLESS NOTED OTHERWISE.
- SPEAKER SYSTEM, SEE FIRE ALARM.
- EXIT LIGHT TO REMAIN, SEE ELECTRICAL.
- DIRECTIONAL EXIT LIGHT TO REMAIN, SEE ELECTRICAL.
- MOTION DETECTOR, SEE ELECTRICAL.
- CEILING HEIGHT DESIGNATION GIVEN IS EXISTING
- EXISTING SPRINKLERS REVISED, COORDINATE WITH MECHANICAL.

KEYNOTES

NUMBER	DESCRIPTION
01.03	NOT PART OF THIS RENOVATION PHASE
02.06	REMOVE EXISTING LIGHT FIXTURES AND REPLACE WITH NEW FIXTURES AS SPECIFIED BY ELECTRICAL ENGINEER.
02.08	EXISTING CEILING TO REMAIN
02.09	EXISTING CEILING TO BE REMOVED.

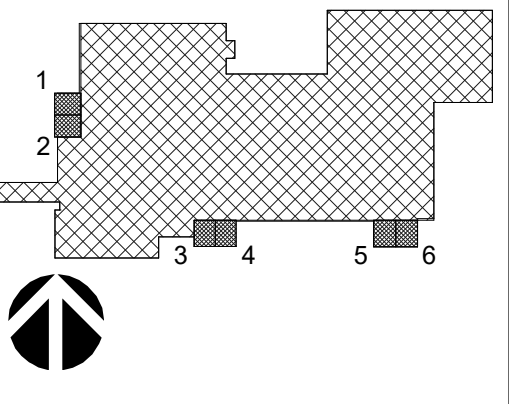


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PURSUANT TO FLORIDA STATUTES, SECTION 550.0030, AN INDIVIDUAL EMPLOYEE OR AGENT MAY NOT BE HELD INDIVIDUALLY LIABLE FOR NEGLIGENCE.

BID DOCUMENTS

DESTIN FORT WALTON BEACH CONVENTION CENTER
HVAC UPGRADES & RESTROOM RENOVATIONS
TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
1250 MIRACLE STRIP PKWY SE
FORT WALTON BEACH, FL 32548



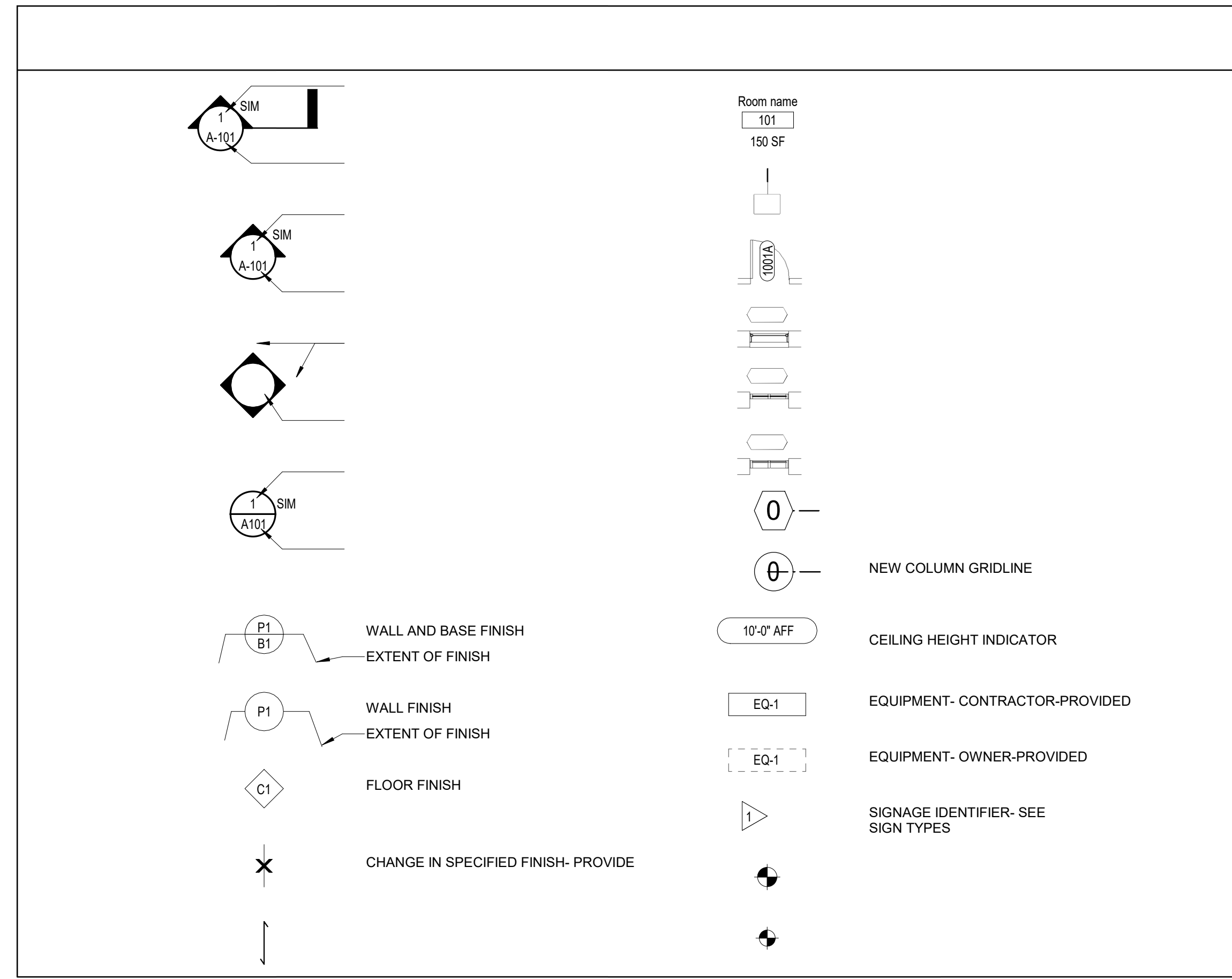
REVISIONS:

No.	Description	Date

ENLARGED DEMO RCP

Project number	17057.8
Dated	04-12-21
PIC	Approver
PM	Designer

D101.2
Scale As indicated



STANDARD ABBREVIATIONS

CKT	CIRCUIT	HYD	HYDRANT	SERV	SERVICE
CL	CENTERLINE	ID	INSIDE DIAMETER	SHT	SHEET
CEIL	CEILING	IE	INVERT ELEVATION	SJ	SAWED JOINT
CG	CORNER GUARD	IIC	IMPACT INSULATION CLASS	SPEC	SPECIFICATIONS
CL	CLOSET	IN	INCHES	SQ FT	SQUARE FEET
CLG	CEILING	INCAND	INCANDESCENT	ST	STEEL
CLR	CLEAR	INSUL	INSULATION	STC	SOUND TRANSMISSION CLASS
CMU	CONCRETE MASONRY UNIT	INT	INTERIOR	STOR	STORAGE
CO	CLEANOUT	JB	JUNCTION BOX	STRUC	STRUCTURAL
COL	COLUMN	JCT	JUNCTION	SUSP	SUSPENDED
CONC	CONCRETE	JT	JOINT	SW	SWITCH
COND	CONDENSATE	KB	KNOX BOX	T	TOILET
CONN	CONNECTION	KVA	KILOVOLT-AMPERE	TEL	TELEPHONE
CONST	CONSTRUCTION	LB, #	POUND	TEMP	TEMPERATURE
CONT	CONTINUOUS	LG	LONG	THK	THICKNESS
CONTR JT	CONTRACTION JOINT	LLV	LONG LEG VERTICAL	THD	THRESHOLD
CSC	COLOR SYMBOL CODE	LP	LIGHTING PANEL	TOC	TOP OF CONCRETE
CT	CERAMIC TILE	LTG	LIGHTING	TOP	TOP OF FOOTING
CTB	CERAMIC TILE BASE	M	MOTOR	TOIL	TOILET
CTOC	CENTER TO CENTER	MAINT	MAINTENANCE	TYP	TYPICAL
DET	DETAIL	MAX	MAXIMUM	UL	UNDERWRITER LABORATORIES
DIA	DIAMETER	MDP	MAIN DISTRIBUTION PANEL	V	VOLT
DIFF	DIFFUSER	MECH	MECHANICAL	VAT	VINYL ASBESTOS TILE



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BID DOCUMENTS

DESTIN FORT WALTON BEACH CONVENTION CENTER
HVAC UPGRADES & RESTROOM RENOVATIONS
 TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
 1250 MIRACLE STRIP PKWY SE
 FORT WALTON BEACH, FL 32548

REVISIONS:

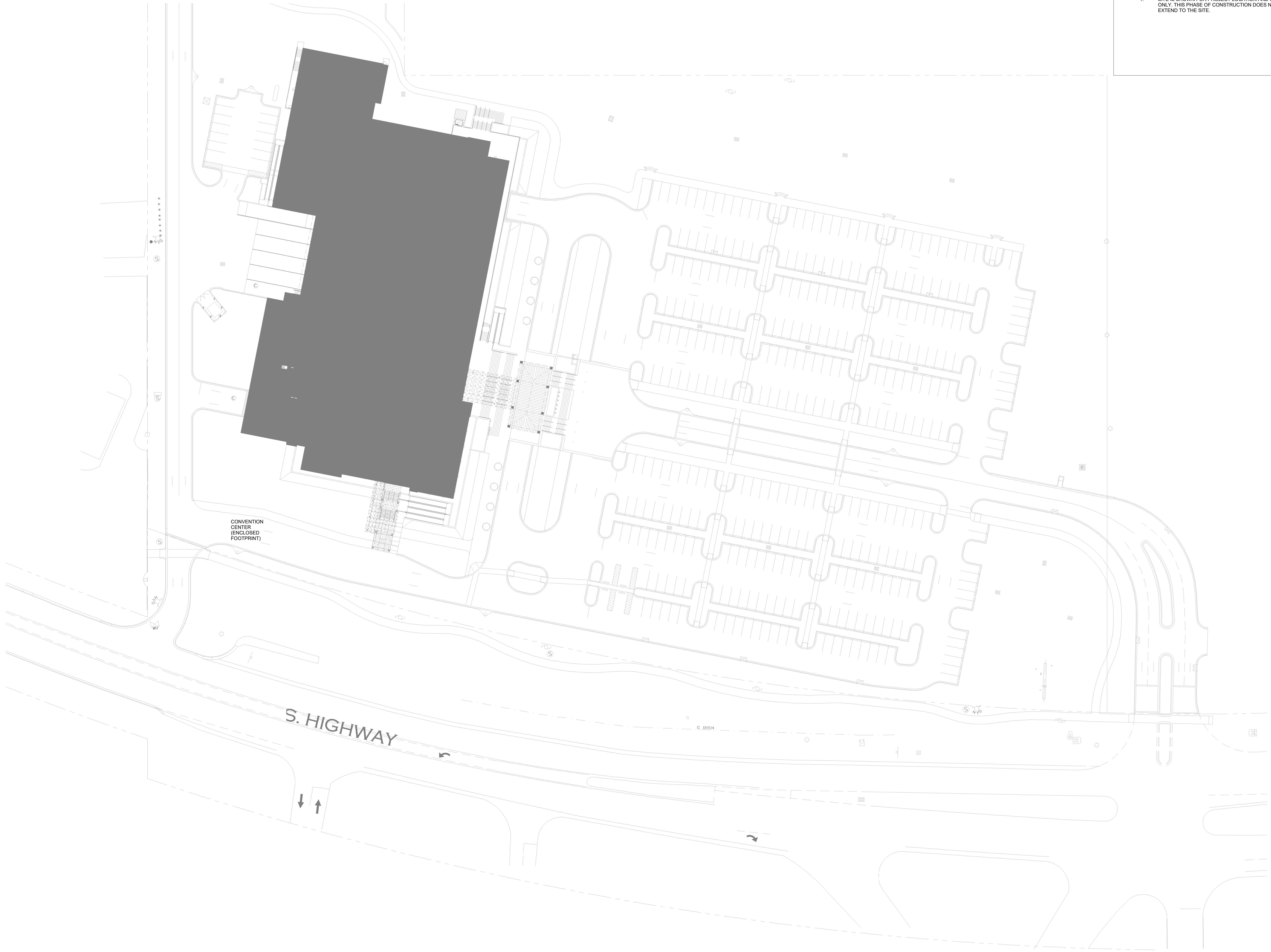
No.	Description	Date

ABBREVIATIONS & SYMBOLS

Project number	17057.8
Dated	04-12-21
PIC	Approver
PM	Designer

A001
 Scale As indicated

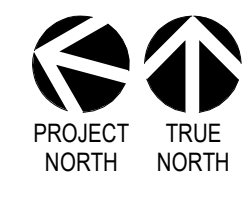
E
 D
 C
 B
 A



CONVENTION CENTER
 (ENCLOSED FOOTPRINT)

S. HIGHWAY

1 ARCHITECTURAL SITE PLAN
 SCALE: 1" = 30'-0"



GENERAL NOTES - SITE

1. SITE IS SHOWN FOR PROJECT LOCATION AND CLARITY ONLY. THIS PHASE OF CONSTRUCTION DOES NOT EXTEND TO THE SITE.

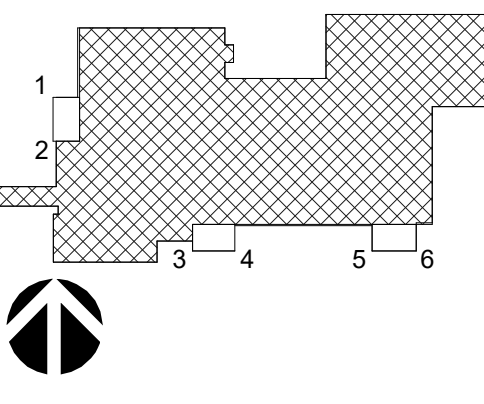


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BID DOCUMENTS

**DESTIN FORT WALTON BEACH CONVENTION CENTER
 HVAC UPGRADES & RESTROOM RENOVATIONS**
 TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
 1250 MIRACLE STRIP PKWY SE
 FORT WALTON BEACH, FL 32548



REVISIONS:

No.	Description	Date

**ARCHITECTURE
 SITE PLAN**

Project number	17057.8
Dated	04-12-21
PIC	Approver
PM	Designer

A100
 Scale 1" = 30'-0"

GENERAL NOTES

1. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO PERFORMING NEW WORK.
2. THE CONTRACTOR SHALL PROVIDE REINFORCING BEHIND WALL MOUNTED AND CEILING MOUNTED EQUIPMENT. COORDINATE WITH A/V, DATA AND ELECTRICAL DRAWINGS.
3. CONTRACTOR SHALL COORDINATE WORK WITH MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS. SEE ENLARGED PLAN SHEETS (A401-A407) FOR FINISHES, FIXTURES, AND DIMENSIONS.

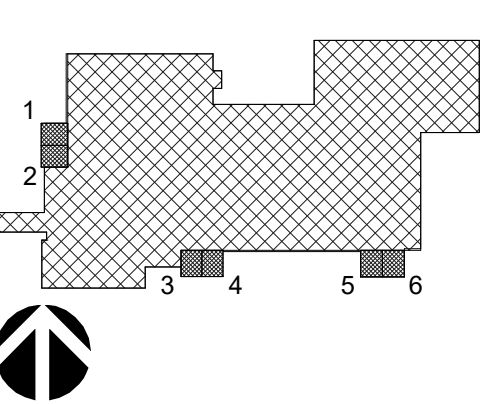


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BID DOCUMENTS

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 HVAC UPGRADES & RESTROOM RENOVATIONS**
 TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
 1250 MIRACLE STRIP PKWY SE
 FORT WALTON BEACH, FL 32548



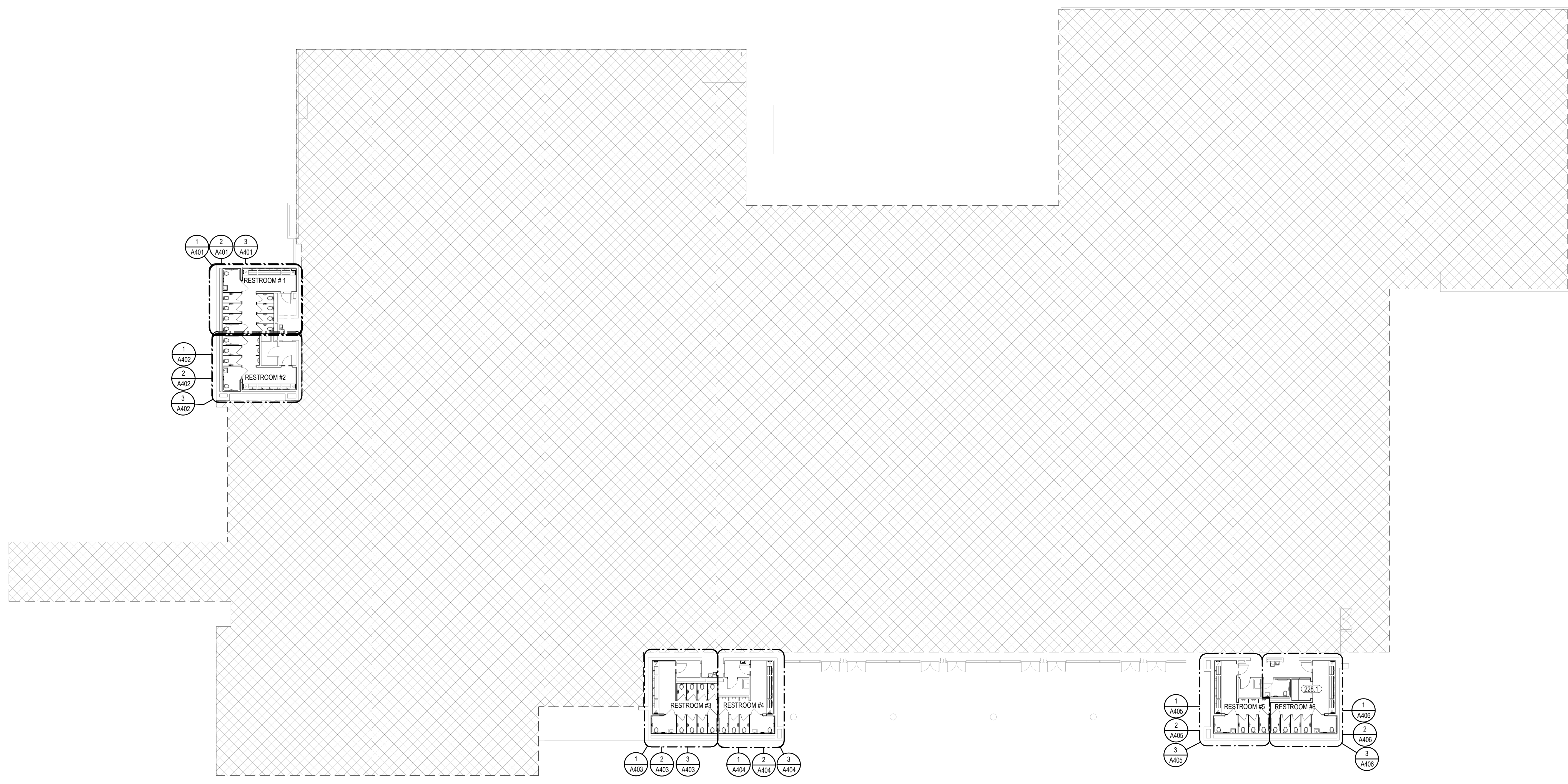
REVISIONS:

No.	Description	Date

OVERALL FIRST FLOOR PLAN

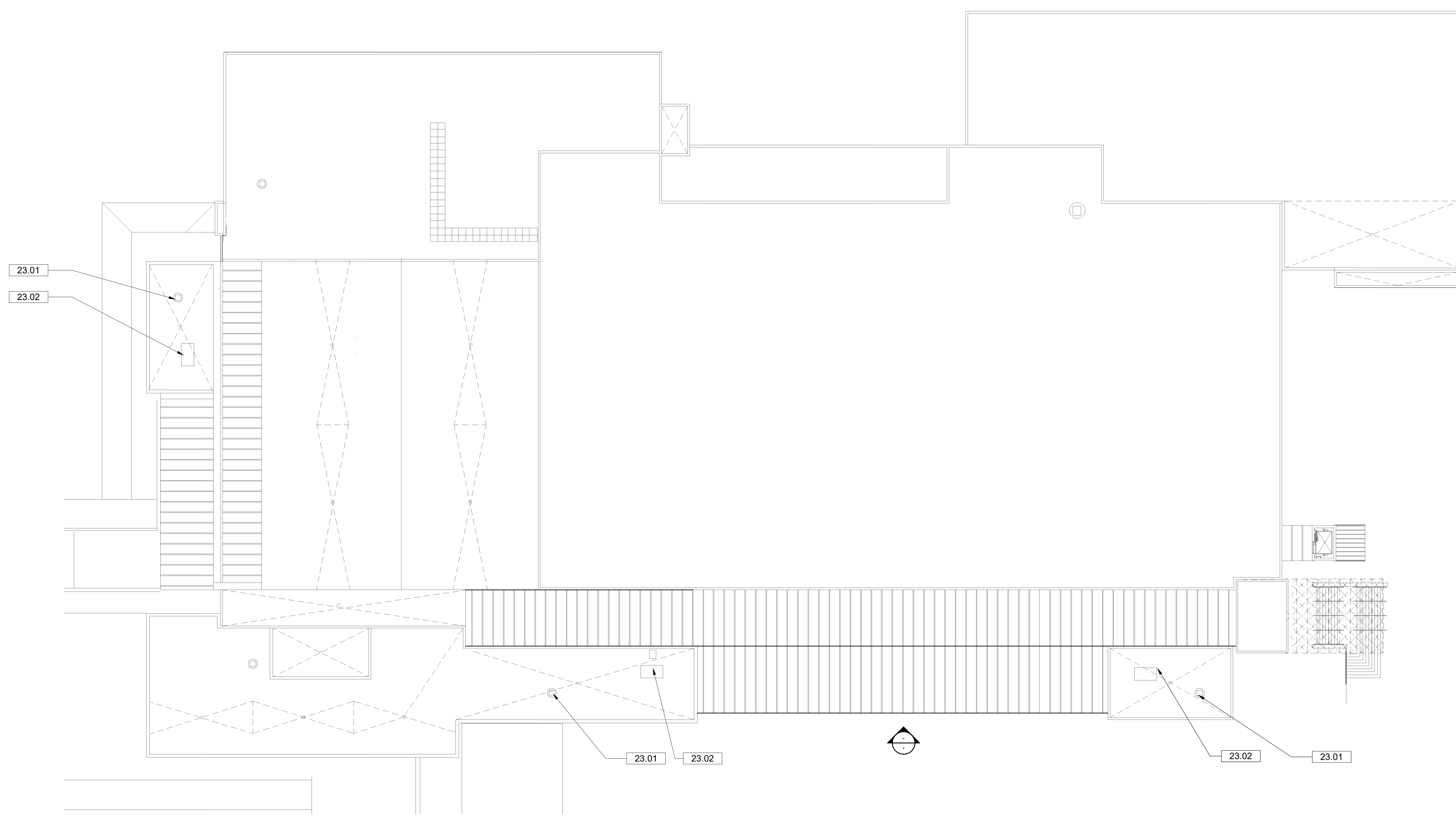
Project number	17057.8
Dated	04-12-21
PIC	Approver
PM	Designer

A101
 Scale As indicated

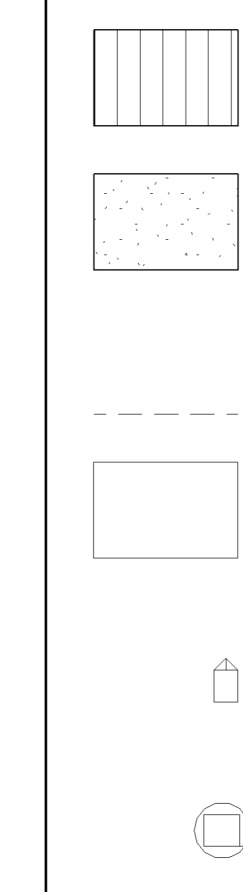


1 OVERALL FIRST FLOOR PLAN
 SCALE: 1/16" = 1'-0"

E
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 A



1 ROOF PLAN
 SCALE: 1/16" = 1'-0"



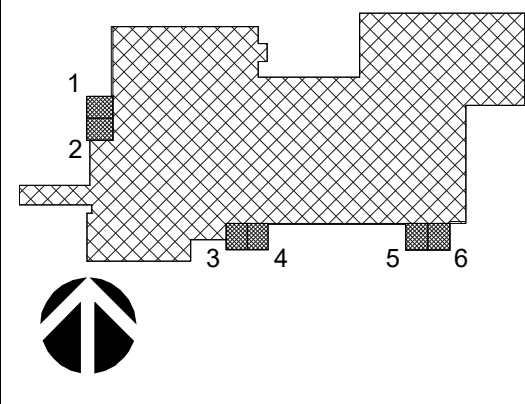
KEYNOTES	
NUMBER	DESCRIPTION
23.01	CONTRACTOR TO CONNECT NEW RESTROOM VENTILATION TO EXISTING MECHANICAL SYSTEM.
23.02	NEW HVAC ROOF UNIT. COORDINATE MOUNTING AND CURBING REQUIREMENTS WITH EXISTING ROOF STRUCTURE



BID DOCUMENTS

DESTIN FORT WALTON BEACH CONVENTION CENTER
HVAC UPGRADES & RESTROOM RENOVATIONS

1250 MIRACLE STRIP PKWY SE
 FORT WALTON BEACH, FL 32548



No.	Description	Date

OVERALL ROOF PLAN

17057.8
 04-12-21
 Approver
 Designer

A102

As indicated

1 2 3 4 5 6

PAINT

- P-1 NO LONGER IN SCOPE OF WORK
- P-2 NO LONGER IN SCOPE OF WORK
- P-3 MANUF: SHERWIN WILLIAMS
COLOR: HIGH REFLECTIVE WHITE
COLOR # SW757
FINISH: SATIN-LATEX ENAMEL
NOTE: WATER RESISTANT RESTROOM CEILING PAINT
- P-4 MANUF: SHERWIN WILLIAMS
COLOR: GRAY MATTERS
COLOR # 7006
FINISH: SATIN
NOTE: RESTROOM VESTIBULE COLOR
- P-5 MANUF: SHERWIN WILLIAMS
COLOR: GAUNTLET GRAY
COLOR # SW7019
FINISH: SATIN
NOTE: RESTROOM ENTRY DOOR FINISH AND FRAME COLOR

TILE

- PT-1 MANUF: PORCELANOSA
COLOR: AVENUE GREY NATURE
COLOR # C220400181-100143084
FINISH: NATURE
NOTE: 12"x24" HORIZONTAL RUNNING BOND
GROUT: G-1 (SEE BELOW)
CONTACT: NAME MIGUEL RODRIGUEZ
PHONE # 305.522.7306
- GT-1 MANUF: BODESI
COLOR: PEACOCK
COLOR # 6254 + 6398 (80)
FINISH: GLASS TILE / GLOSSY
NOTE: 4"x12" VERTICAL STACK BOND
GROUT: G-2 (SEE BELOW)
CONTACT: NAME BO WOJTYRA
PHONE # 1.888.658.2488
- GT-2 MANUF: ELIDA CERAMICA
ITEM # 915526
MODEL # GPLW
COLOR: WHITE
FINISH: GLOSSY
NOTE: DECORATIVE PENCIL LINER
GROUT: G-1 (SEE BELOW)
- G-1 MANF: MAPEI
COLOR: CHARCOAL
COLOR # 47
- G-2 MANF: MAPEI
COLOR: WARM GRAY
COLOR # 93

FLOORING

- LVT-1 MANUFACTURER: TARKETT/TANDUS CENTIVA
PRODUCT # PCFN 10023
COLOR: GREY/GREEN CUSTOM
FINISH: EMBOSSED IN QU (QUARRY)
NOTE: OWNER FURNISHED
CONTRACTOR TO INSTALL- TO MATCH EXISTING
CONTACT: GINGER DYSON
PHONE # 1.251.604.6897
- RB-1 MANUFACTURER: JOHNSONITE/TARKETT
PRODUCT: MILLWORK MONARCH
PRODUCT # MW-01-M
COLOR # CHARCOAL WG 20
NOTE: MATCH TO EXISTING BASE IN HALL
CONTACT: GINGER DYSON
PHONE # 1.251.604.6897
- WB-1 MANUFACTURER: SHERWIN WILLIAMS
PRODUCT: PAINT SEMI-GLOSS
COLOR CODE: SW 7008
COLOR NAME # GRIZZLE GRAY
NOTE: MATCH TO RUBBER BASE COLOR

SOLID SURFACE

- SS-1 NO LONGER IN PROJECT SCOPE
- SS-2 MANUFACTURER: PORCELANOSA KRION
PRODUCT # L105-G9
COLOR: LUXURY SERIES, CARRARA DARK
FINISH: MATTE
NOTE: STALL PARTITIONS- TWO 1/2" PANELS SANDWICHED TOGETHER
CONTACT: SAID MARIA, PRODUCT MANAGER
786.427.7548
SMARIA@PORCELANOSA-USA.COM
- SS-3 MANUFACTURER: PORCELANOSA KRION
PRODUCT # 9105-G7
COLOR: ROYAL- SERIES, ELEGANT WHITE
FINISH: MATTE
NOTE: RESTROOM COUNTERTOPS
SAID MARIA, PRODUCT MANAGER
786.427.7548
SMARIA@PORCELANOSA-USA.COM

FINISH LEGEND

FINISH SYMBOLS

- WALL AND BASE FINISH
EXTENT OF FINISH
- WALL FINISH
EXTENT OF FINISH
- FLOOR FINISH
- CHANGE IN SPECIFIED FINISH- PROVIDE TRANSITION STRIP AS REQUIRED
- DIRECTION OF SPECIFIED FINISH

FLOORING

- MATERIAL 1, PT-1
- MATERIAL 2, LVT-1 [OWNER FURNISHED, CONTRACTOR INSTALLED]

WALLS

- TILE 1, PT-1
- TILE 2, GT-1
- TILE 3, CT-1
- SS-2 (STALL PARTITIONS + URINAL DIVIDERS)

COUNTERTOPS

- SS-3, SS-1 (REFER TO KEYNOTES + FINISH PLANS/ELEVATIONS)

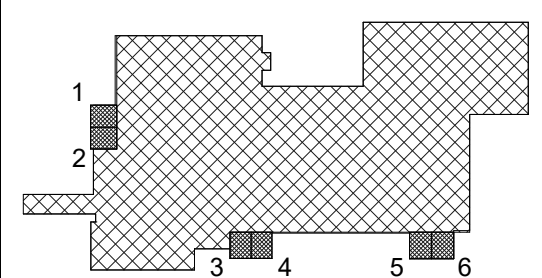


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PURSUANT TO FLORIDA STATUTES, SECTION 550.0030, AN INDIVIDUAL EMPLOYEE OR AGENT MAY NOT BE HELD INDIVIDUALLY LIABLE FOR NEGLIGENCE.

BID DOCUMENTS

**DESTIN FORT WALTON BEACH CONVENTION CENTER
HVAC UPGRADES & RESTROOM RENOVATIONS**
 TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
 1250 MIRACLE STRIP PKWY SE
 FORT WALTON BEACH, FL 32548



REVISIONS:

No.	Description	Date

INTERIOR FINISH LEGEND

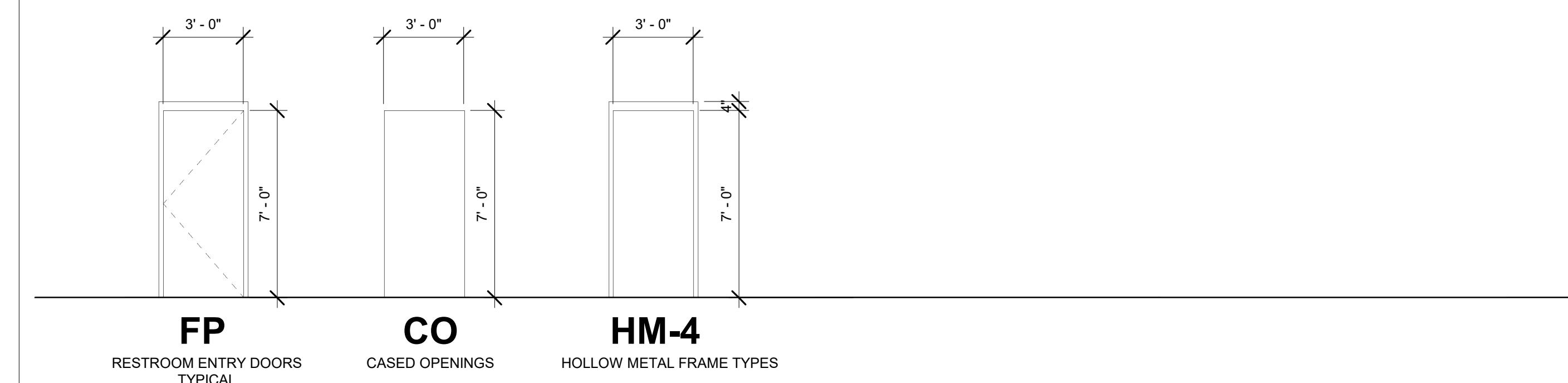
Project number	17057.8
Dated	04-12-21
PIC	Approver
PM	Designer

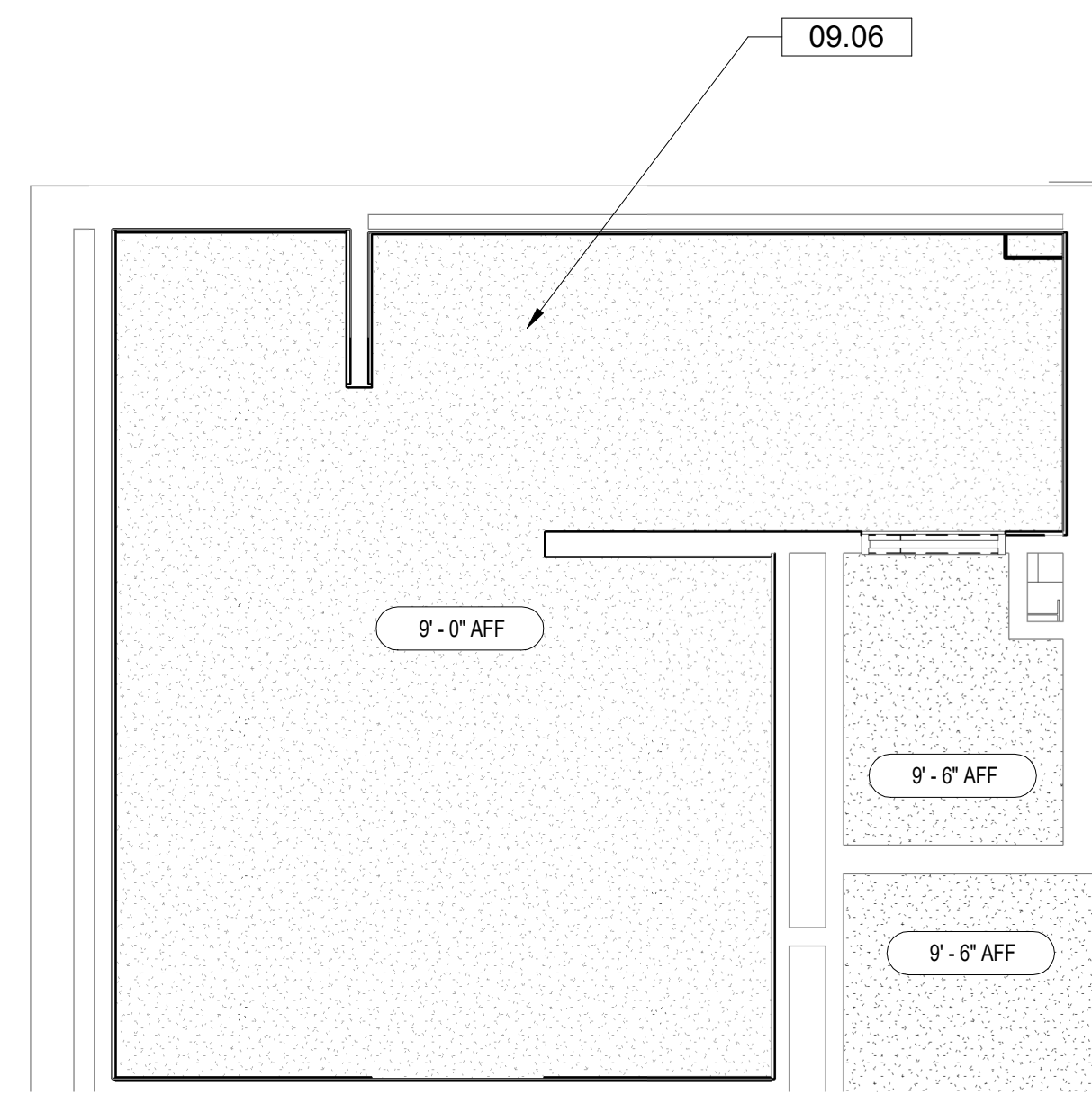
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Scale As indicated

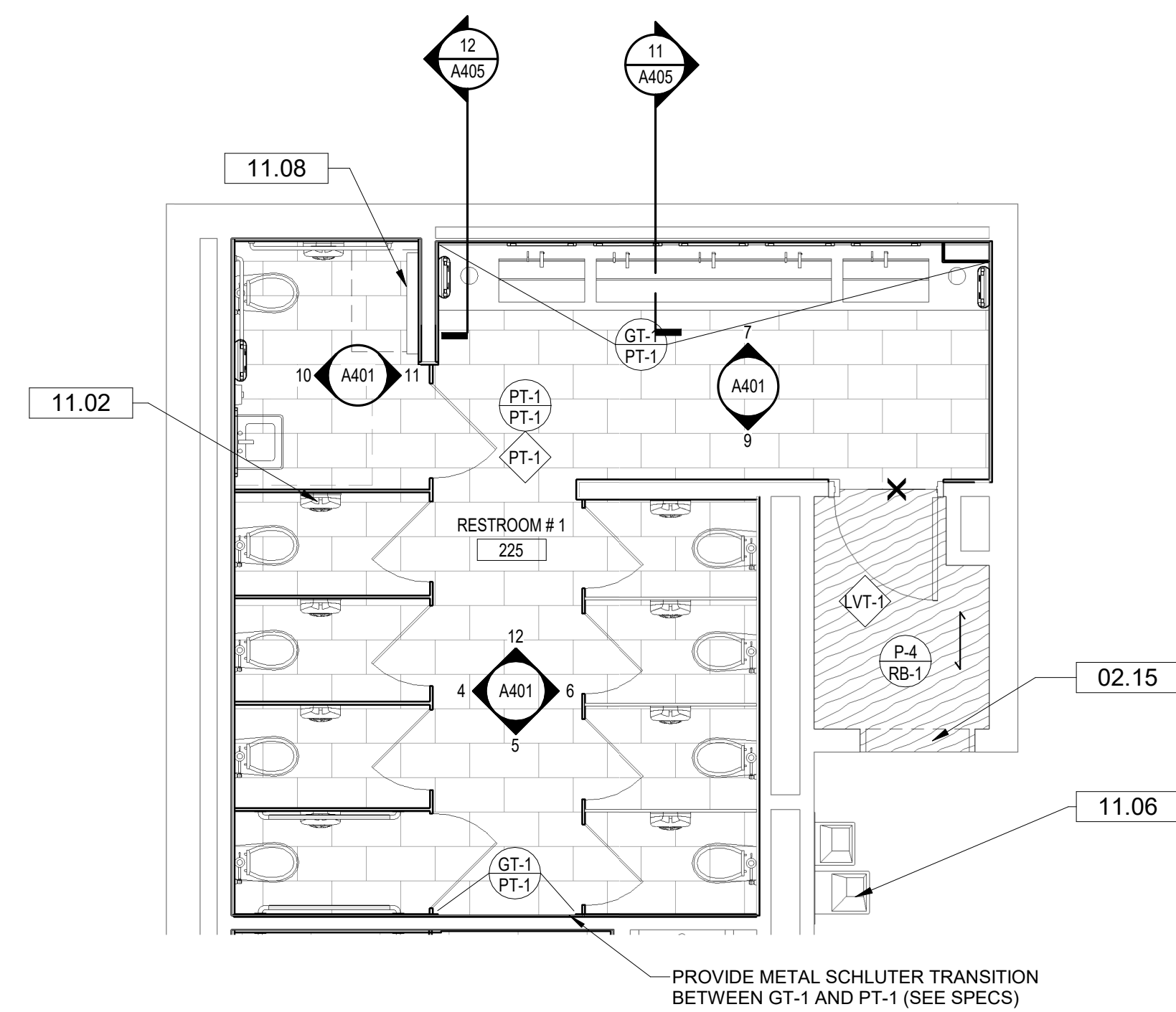
DOOR SCHEDULE

MARK	DOOR			SIZE		FRAME		HARDWARE SET	COMMENTS
	DOOR MATERIAL	DOOR TYPE		WIDTH	HEIGHT	FRAME TYPE	FRAME MATERIAL		
223	-	FP		3'-0"	7'-0"	HM-4	HM	---	ATTEMPT TO SALVAGE AND REFINISH EXISTING DOOR AND FRAME FOR REINSTALLATION. IF DAMAGE OCCURS, REPLACE WITH SAME FRAME AND MATCHING (FP) DOOR TYPE, EITHER HM-4 OR HM-2
224	-	FP		3'-0"	7'-0"	HM-4	HM	---	FINISH EXISTING DOOR AND FRAME FOR REINSTALLATION. IF DAMAGE OCCURS, REPLACE WITH SAME FRAME AND MATCHING (FP) DOOR TYPE, EITHER HM-4 OR HM-2
224.1	-	-		3'-0"	7'-0"	CO	HM	n/a	
225	-	FP		3'-0"	7'-0"	HM-4	HM	---	FINISH EXISTING DOOR AND FRAME FOR REINSTALLATION. IF DAMAGE OCCURS, REPLACE WITH SAME FRAME AND MATCHING (FP) DOOR TYPE, EITHER HM-4 OR HM-2
225.1	-	-		3'-0"	7'-0"	CO	HM	n/a	
226	-	FP		3'-0"	7'-0"	HM-4	HM	---	FINISH EXISTING DOOR AND FRAME FOR REINSTALLATION. IF DAMAGE OCCURS, REPLACE WITH SAME FRAME AND MATCHING (FP) DOOR TYPE, EITHER HM-4 OR HM-2
226.1	-	-		3'-0"	7'-0"	CO	HM	n/a	
227	-	FP		3'-0"	7'-0"	HM-4	HM	---	FINISH EXISTING DOOR AND FRAME FOR REINSTALLATION. IF DAMAGE OCCURS, REPLACE WITH SAME FRAME AND MATCHING (FP) DOOR TYPE, EITHER HM-4 OR HM-2
228	-	FP		3'-0"	7'-0"	HM-4	HM	---	FINISH EXISTING DOOR AND FRAME FOR REINSTALLATION. IF DAMAGE OCCURS, REPLACE WITH SAME FRAME AND MATCHING (FP) DOOR TYPE, EITHER HM-4 OR HM-2
228.1	-	-		5'-0"	7'-0"	CO	HM	n/a	

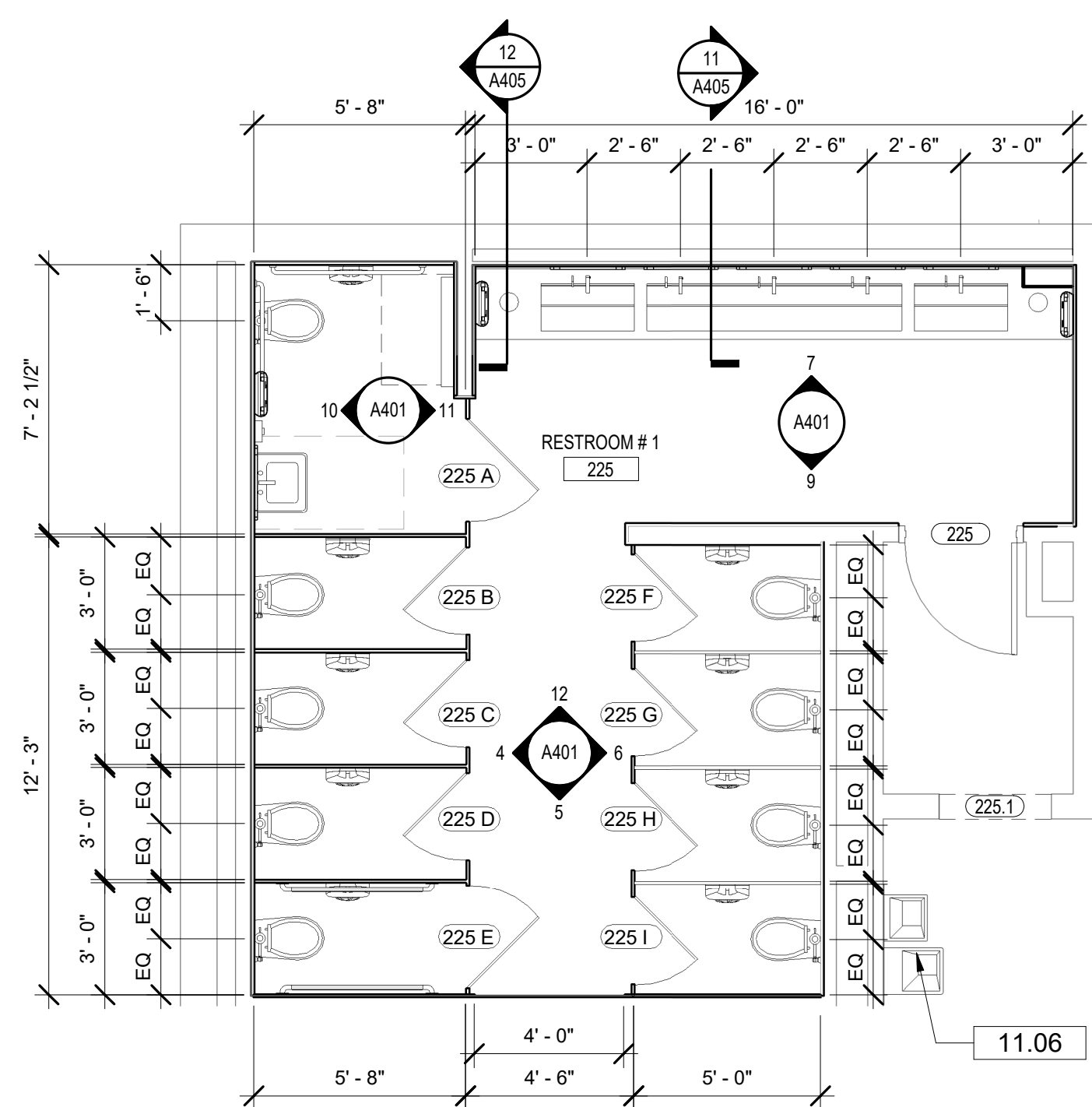




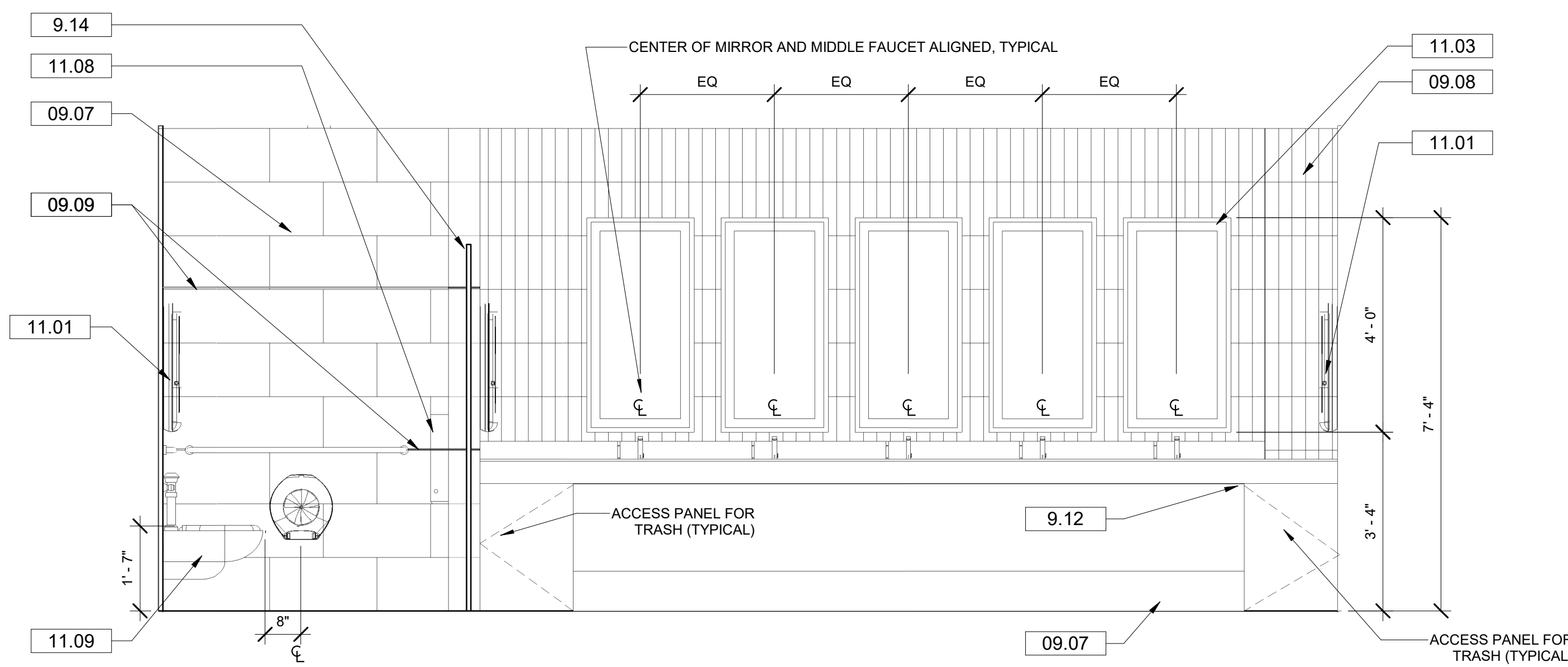
3 RCP - RESTROOM 1
SCALE: 1/4" = 1'-0"



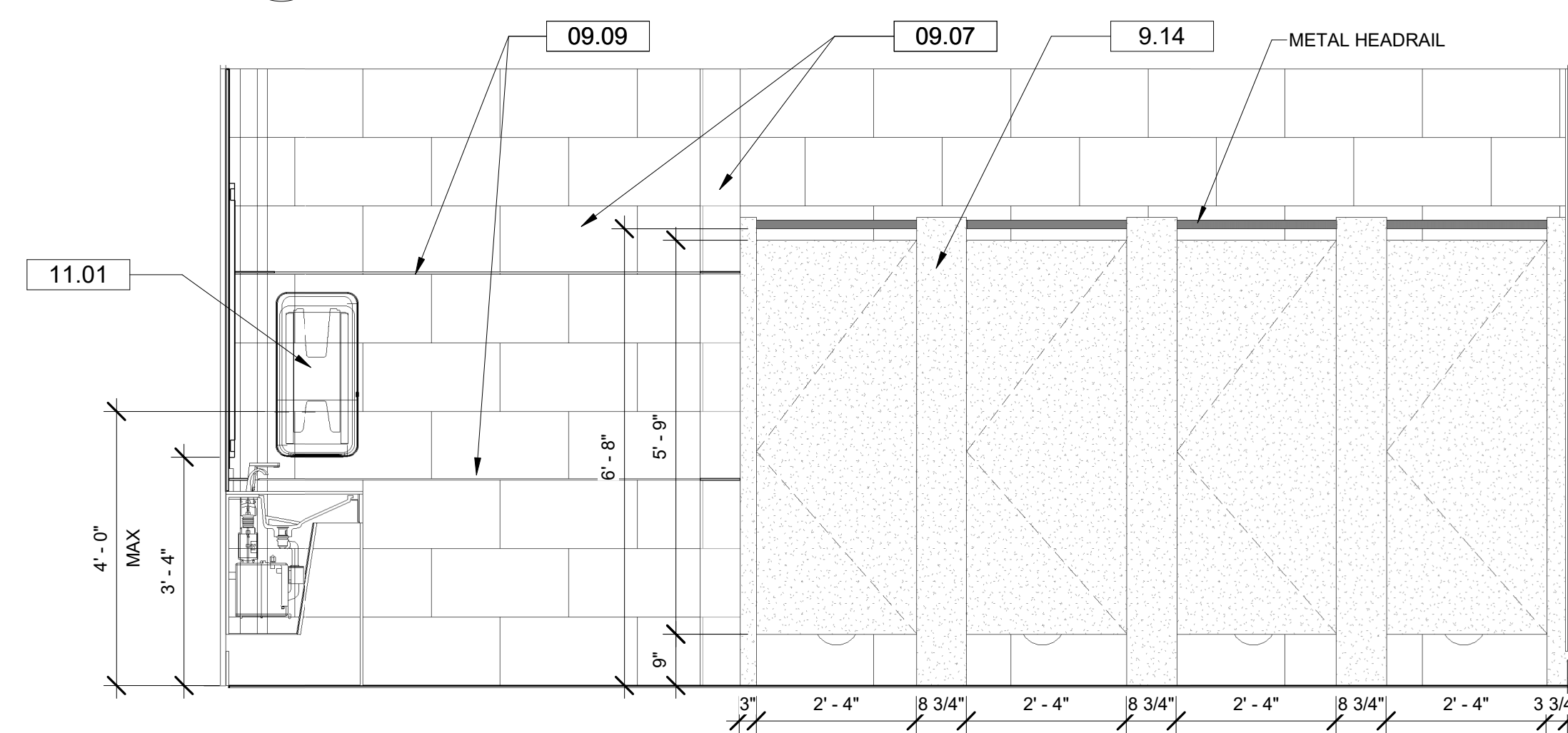
2 FINISH PLAN - RESTROOM 1
SCALE: 1/4" = 1'-0"



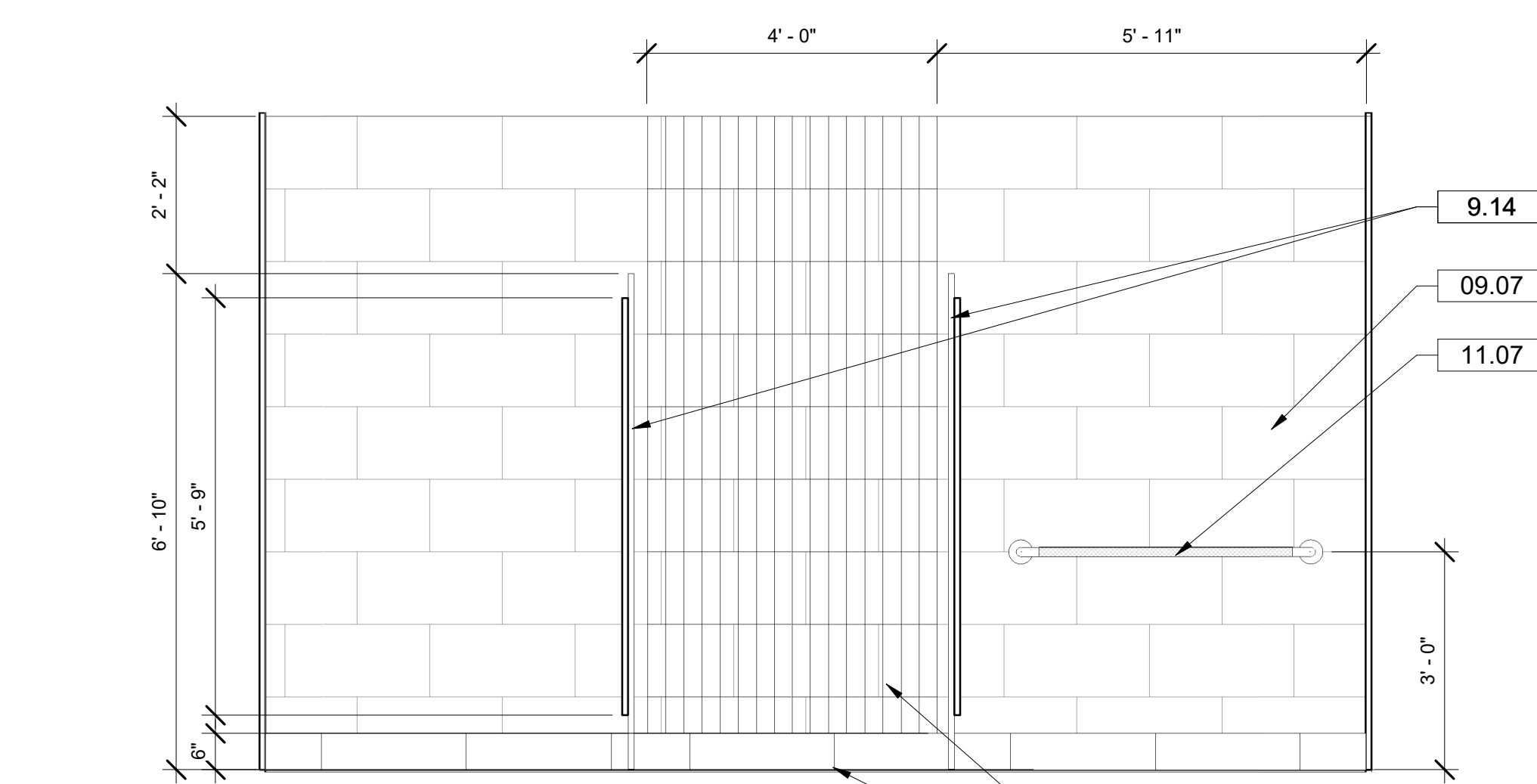
1 DIMENSION PLAN - RESTROOM 1
SCALE: 1/4" = 1'-0"



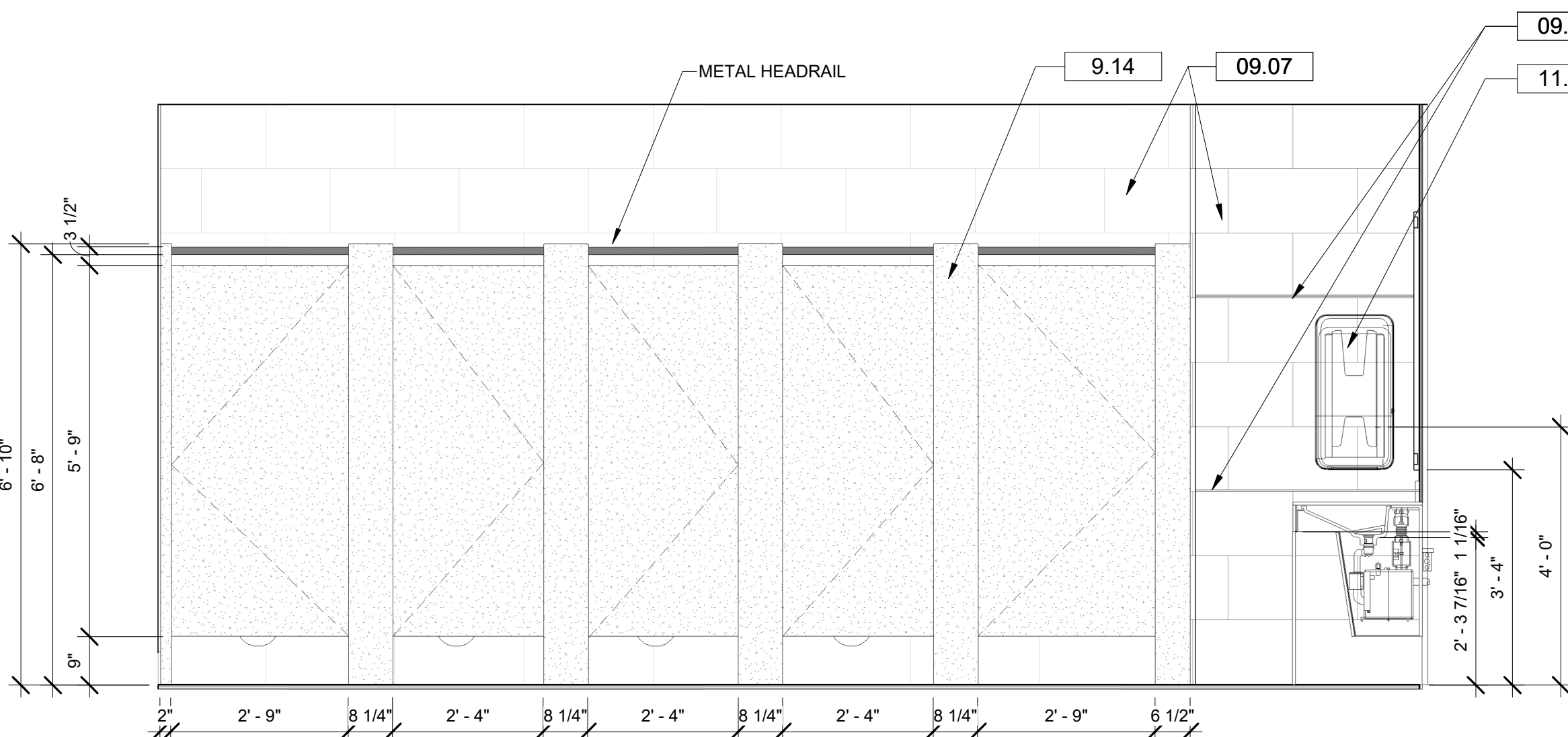
7 RESTROOM 1 - N. ELEV. a
SCALE: 1/2" = 1'-0"



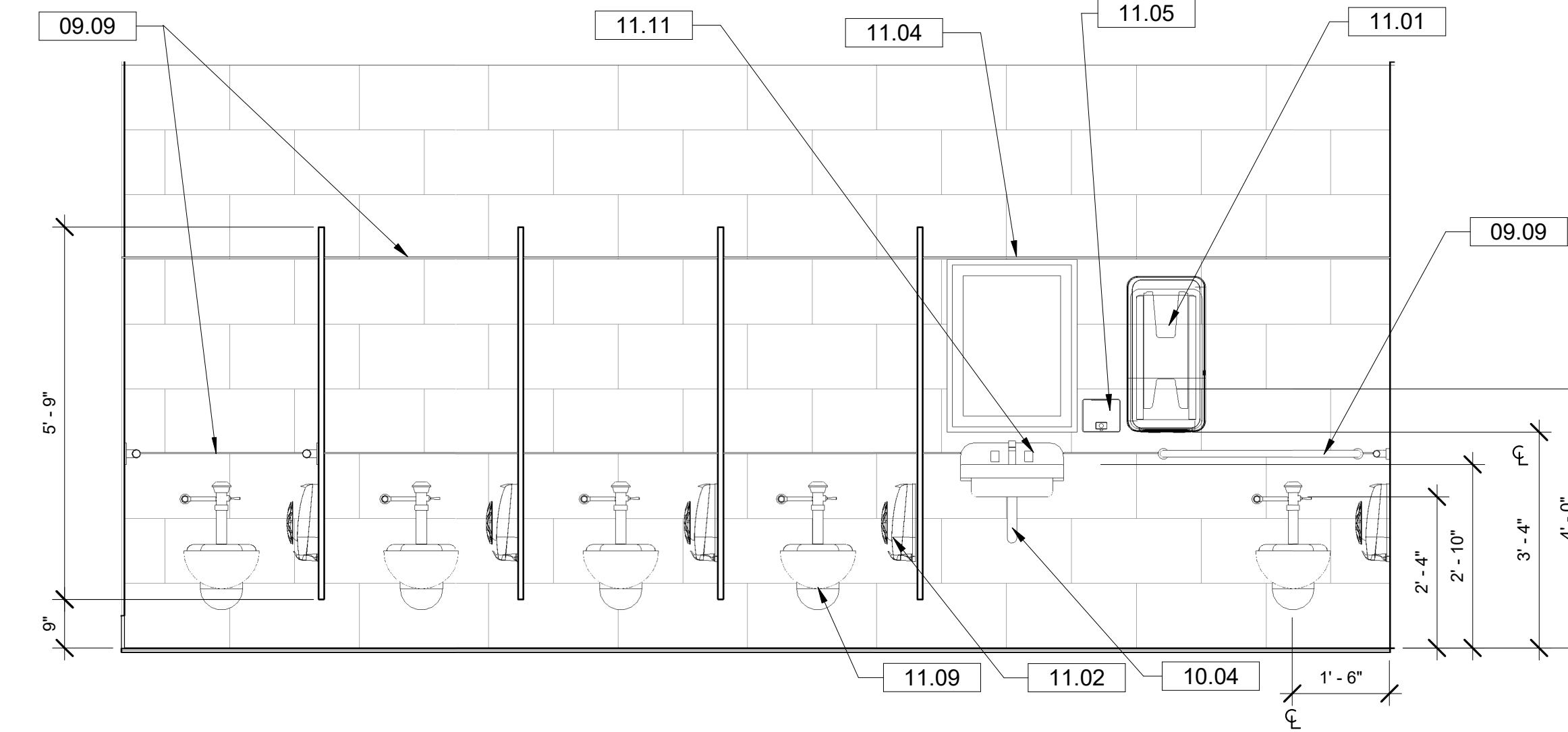
6 RESTROOM 1 - E. ELEV. a
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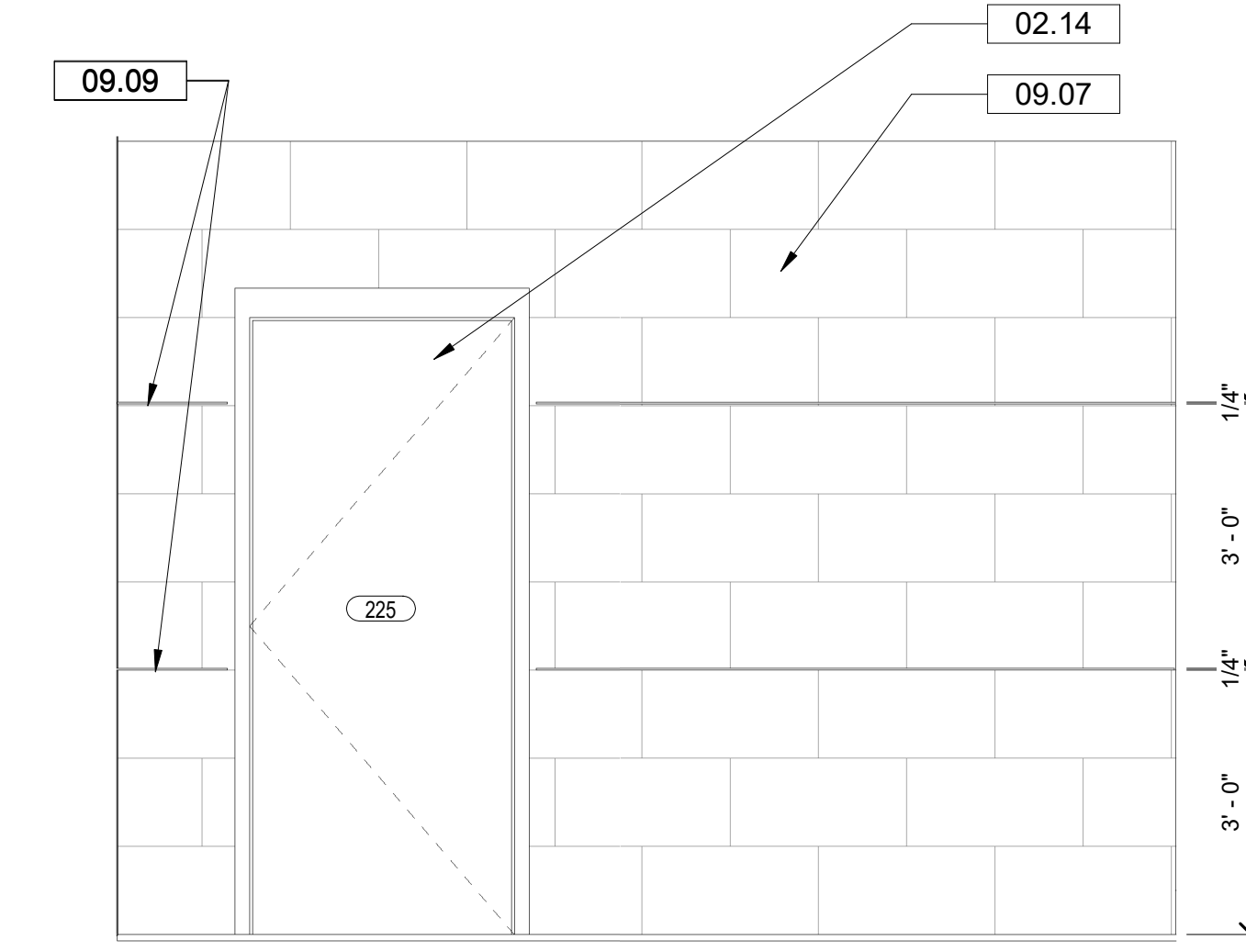
5 RESTROOM 1 - S. ELEV. b
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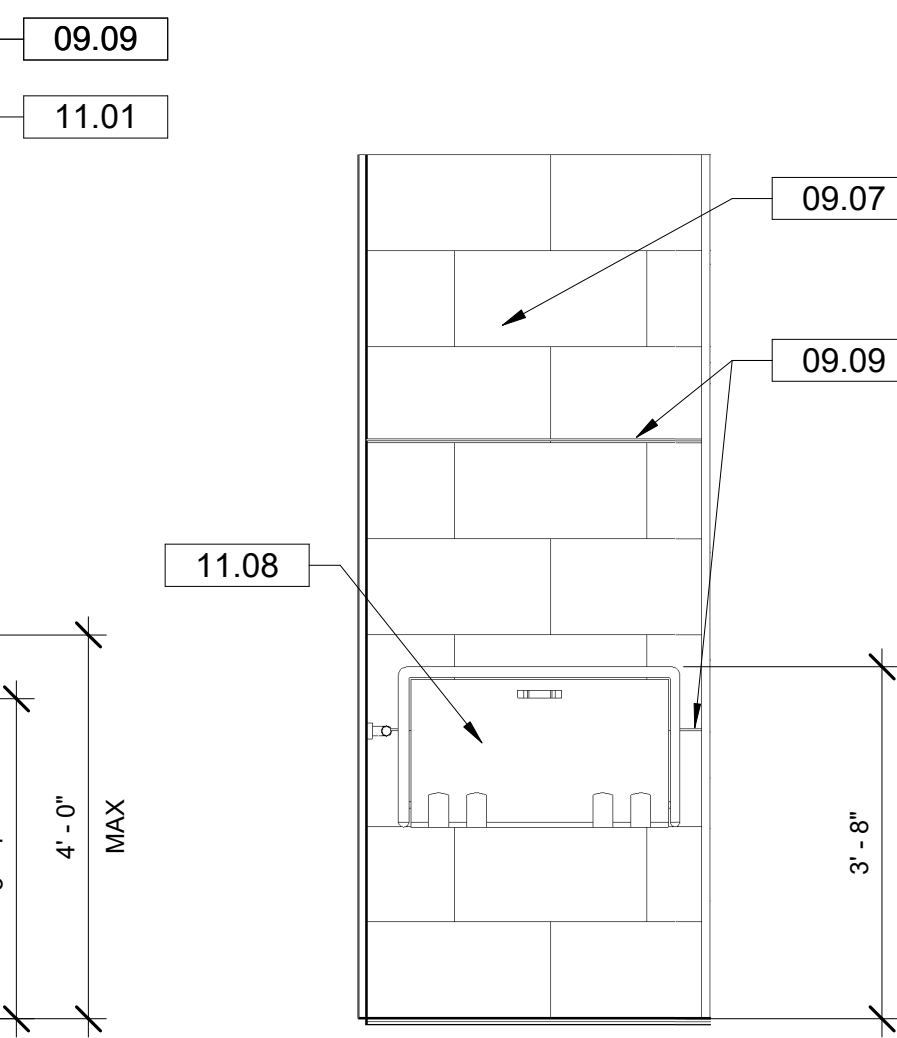
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SCALE: 1/2" = 1'-0"



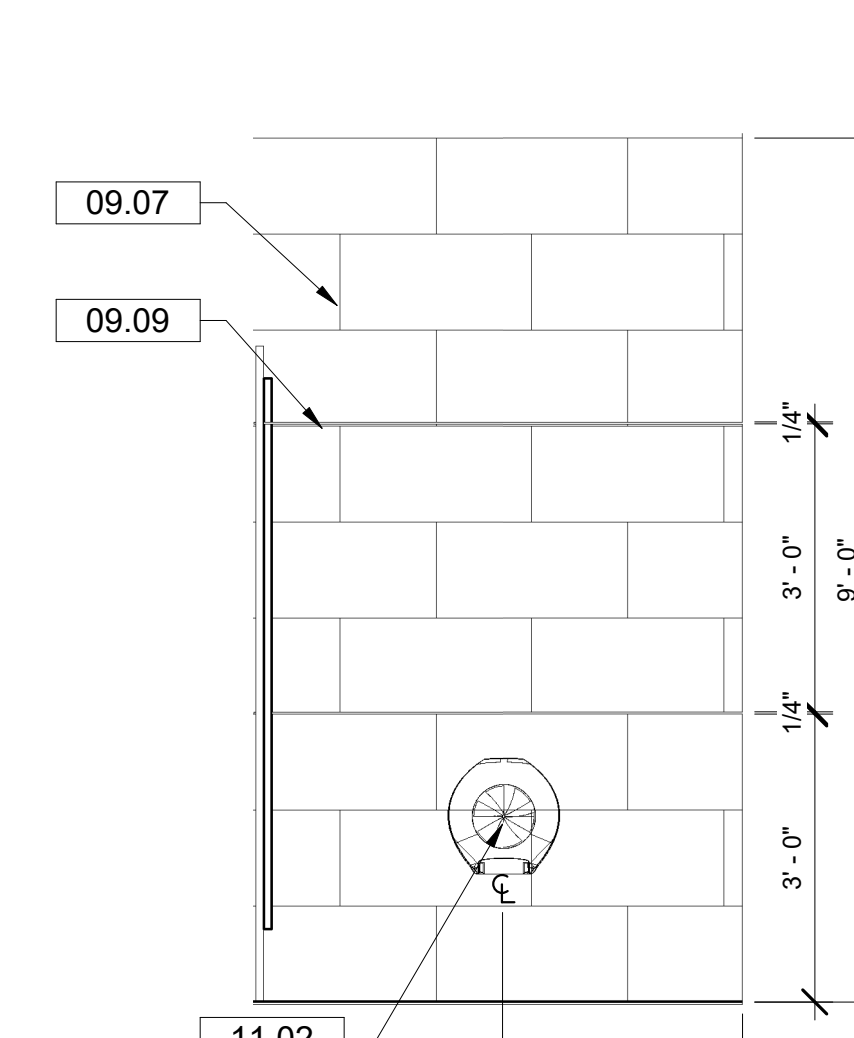
10 RESTROOM 1 - W. ELEV. b
SCALE: 1/2" = 1'-0"



9 RESTROOM 1 - S. ELEV. a
SCALE: 1/2" = 1'-0"



11 RESTROOM 1 - E. ELEV. b
SCALE: 1/2" = 1'-0"



12 RESTROOM 1 - N. ELEV. b
SCALE: 1/2" = 1'-0"

GEN. NOTES: ENLG. PLAN

1. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO PERFORMING NEW WORK.
2. THE CONTRACTOR SHALL PROVIDE SHIELDING OR BACKING AS REQUIRED FOR WALL-MOUNTED AND CEILING MOUNTED EQUIPMENT.
3. CONTRACTOR SHALL COORDINATE WORK WITH MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS.
4. REFER TO FINISH LEGEND ON SHEET A400 FOR MORE INFORMATION ABOUT FINISHES SHOWN ON THIS SHEET.
5. PROVIDE POSITIVE SLOPE TOWARDS ALL FLOOR DRAINS.
6. STALL DOORS SHOWN IN ENLARGED FLOORPLANS AS A-H FOR PARTITION HARDWARE COORDINATION ONLY. NOT RELEVANT TO DOOR SCHEDULE.
7. AUTOMATIC SOAP DISPENSER AND FAUCET SPECIFIED BY PLUMBING ENGINEER.

GENERAL NOTES: RCP

1. SEE SHEET A400 FOR ROOM FINISH SCHEDULE FOR ADDITIONAL INFORMATION.
2. ALL ACCESS PANEL LOCATIONS TO BE COORDINATED WITH MECHANICAL, ELECTRICAL, PLUMBING AND FIRE SPRINKLER WORK.
3. REPLACE CEILING AT NEW HEIGHT IN RESTROOMS #1 TO #6.
4. SEE ELECTRICAL FOR LIGHTING FIXTURE SCHEDULE.
5. WHERE APPLICABLE, ALL FIRE SPRINKLER HEADS AND ELECTRICAL FIXTURES SHALL BE CENTERED WITHIN CEILING TILES.
6. IF ANY ITEMS INDICATED ON THE DRAWINGS ARE IN CONFLICT WITH ONE ANOTHER, CONTRACTOR IS RESPONSIBLE FOR BRINGING TO ARCHITECT FOR FURTHER CLARIFICATION ON DESIGN INTENT.

KEYNOTES

NUMBER	DESCRIPTION
02.14	REMOVE, REFINISH AND REPLACE EXISTING DOOR. PROTECT EXISTING FRAME, REFINISH AND PAINT DOORS AND FRAMES - SW7019 GAUNTLET GRAY.
02.15	REMOVE EXISTING DOOR AND FRAME, REFINISH OPENING WITH GYP. BOARD AND PAINT.
09.06	P-3 WATER RESISTANT PAINT SHERWIN WILLIAMS SW7757 HIGH REFLECTIVE WHITE FLAT (RESTROOM CEILING)
09.07	PT-1 PORCELAIN TILE: PORCELANOSA AVENUE GREY, 12X24, FINISH NATURAL
09.08	GT-1 GLASS TILE: BODESI GLASS TILE, 4X12 COLOR PEACOCK
09.09	GT-2 GLASS PENCIL LINER: ELIDA CERAMICA 12X0.51, GLOSSY (OR SIMILAR)
9.12	SS-3 SOLID SURFACE SINK SYSTEM WITH 3 STATION TROUGH, 2 INDIVIDUAL TROUGHS, AND 2 TRASH RECEPTACLE CUTOUTS. MATERIAL: PORCELANOSA KRION SOLID SURFACE ROYAL - SERIES ELEGANT WHITE 9105-G7. MANUFACTURER AND INSTALL BY KRION
9.14	SS-2 SOLID SURFACE: PORCELANOSA KRION CARRARA DARK L105-G9. HARDWARE BY KRION MANUFACTURER PROVIDED
10.04	PROVIDE STANDARD PIPE WRAP AT LAV. FOR ANY EXPOSED INSTANCE. SEE PLUMBING FOR SPECIFICATION.
11.01	TORK HAND TOWEL DISPENSER, 552520, WHITE, OWNER PROVIDED, CONTRACTOR INSTALLED
11.02	TORK 3 ROLL BATH TISSUE ROLL DISPENSER, 565828, WHITE, OWNER PROVIDED, CONTRACTOR INSTALLED
11.03	MIRROR: PARIS MIRROR: LIGHTED MIRROR HARMONY; 24X48" LED 110V WIRING [Model # HARM24323000K-24v0]
11.04	MIRROR: PARIS MIRROR: LIGHTED MIRROR HARMONY; 24X32" LED 110V WIRING [Model # HARM24323000K-24v0]
11.05	ADA SOAP DISPENSER, OWNER FURNISHED, CONTRACTOR INSTALLED (SEE PLUMBING SPEC)
11.06	WATER COOLER SPECIFIED BY PLUMBING ENGINEER
11.07	GB: GRAB BAR (ADA HEIGHT) MOUNTED BETWEEN 33-36" AFF
11.08	CHANGING TABLE: KOALA KARE KB200-05, WHITE GRANITE; MOUNTED 24" AFF
11.09	ADA ADULT TOILET (WALL MOUNTED) (SEE PLUMBING SPECS)
11.11	ADA LAVATORY SPECIFIED BY PLUMBING ENGINEER

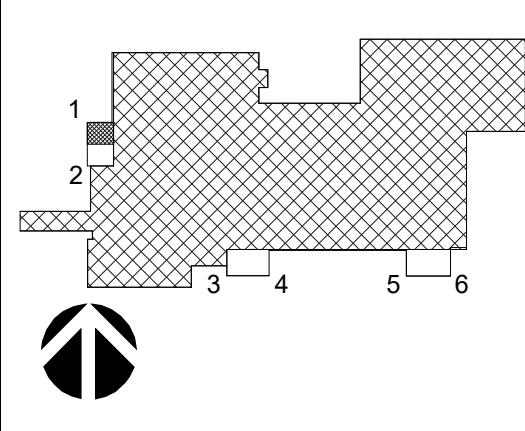


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BID DOCUMENTS

DESTIN FORT WALTON BEACH CONVENTION CENTER
HVAC UPGRADES & RESTROOM RENOVATIONS
TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
1250 MIRACLE STRIP PKWY SE
FORT WALTON BEACH, FL 32548



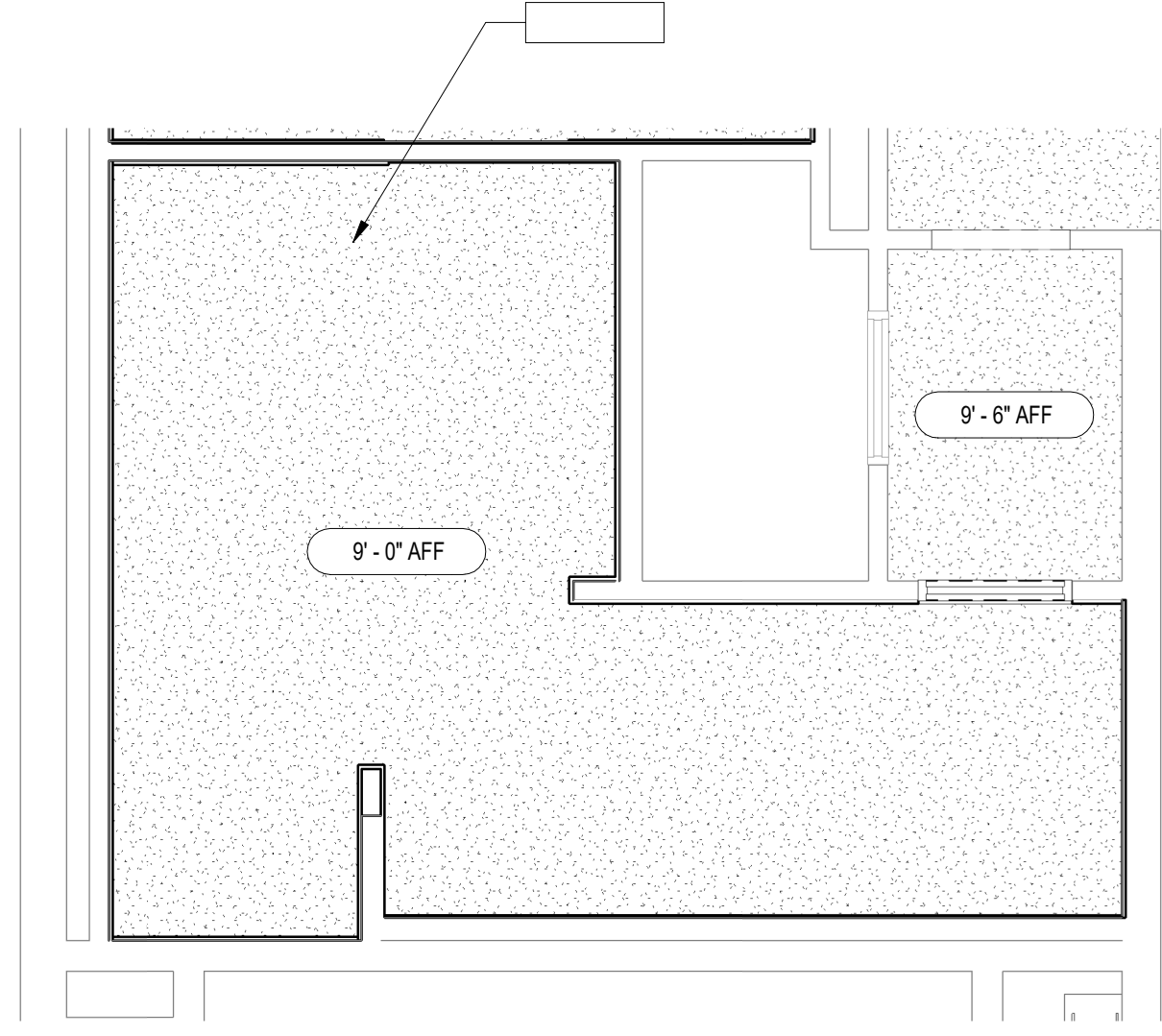
REVISIONS:

No.	Description	Date

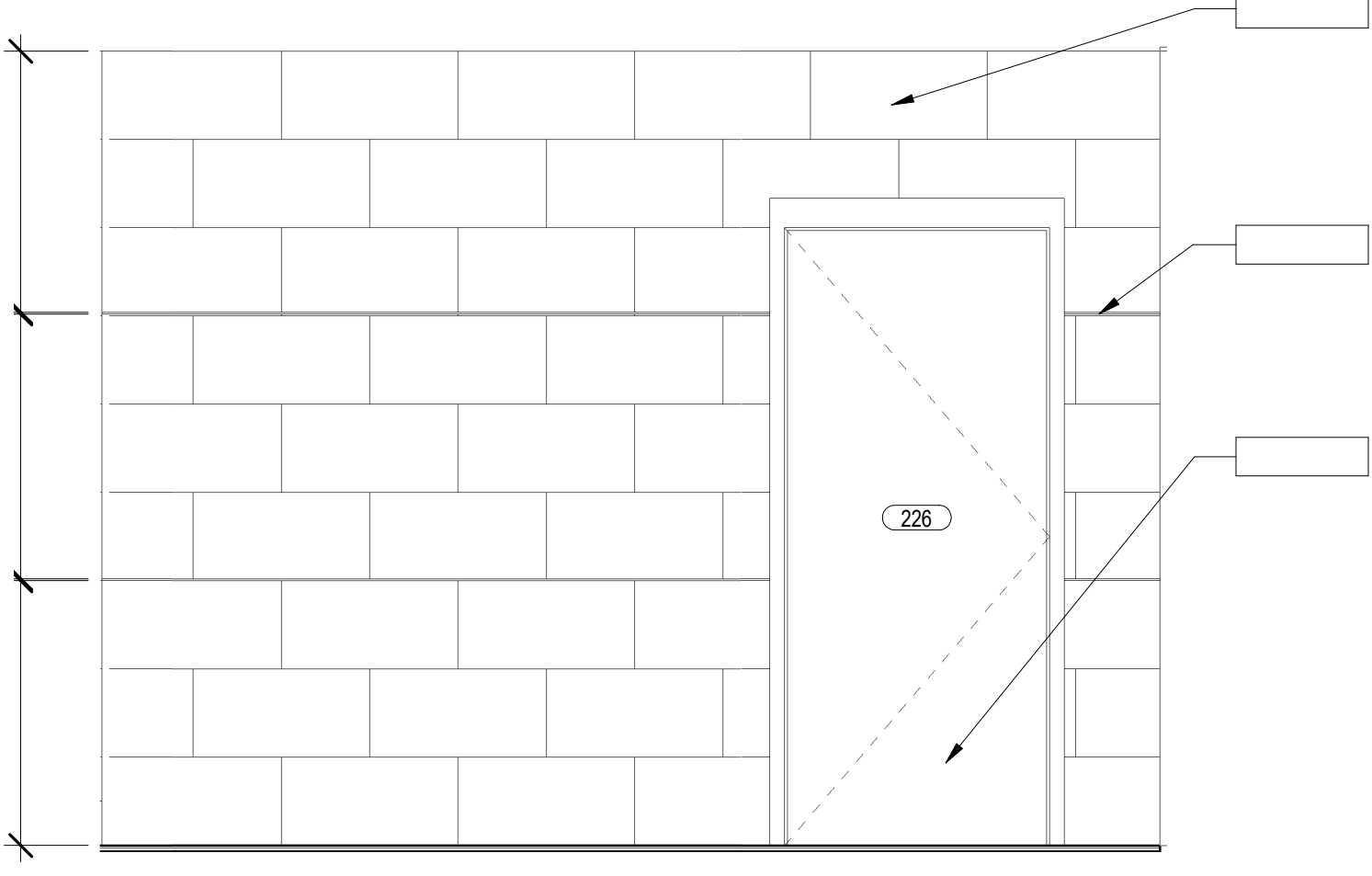
ENLARGED PLAN - RESTROOM 1

Project number	17057.8
Dated	04-12-21
PIC	Approver
PM	SLN

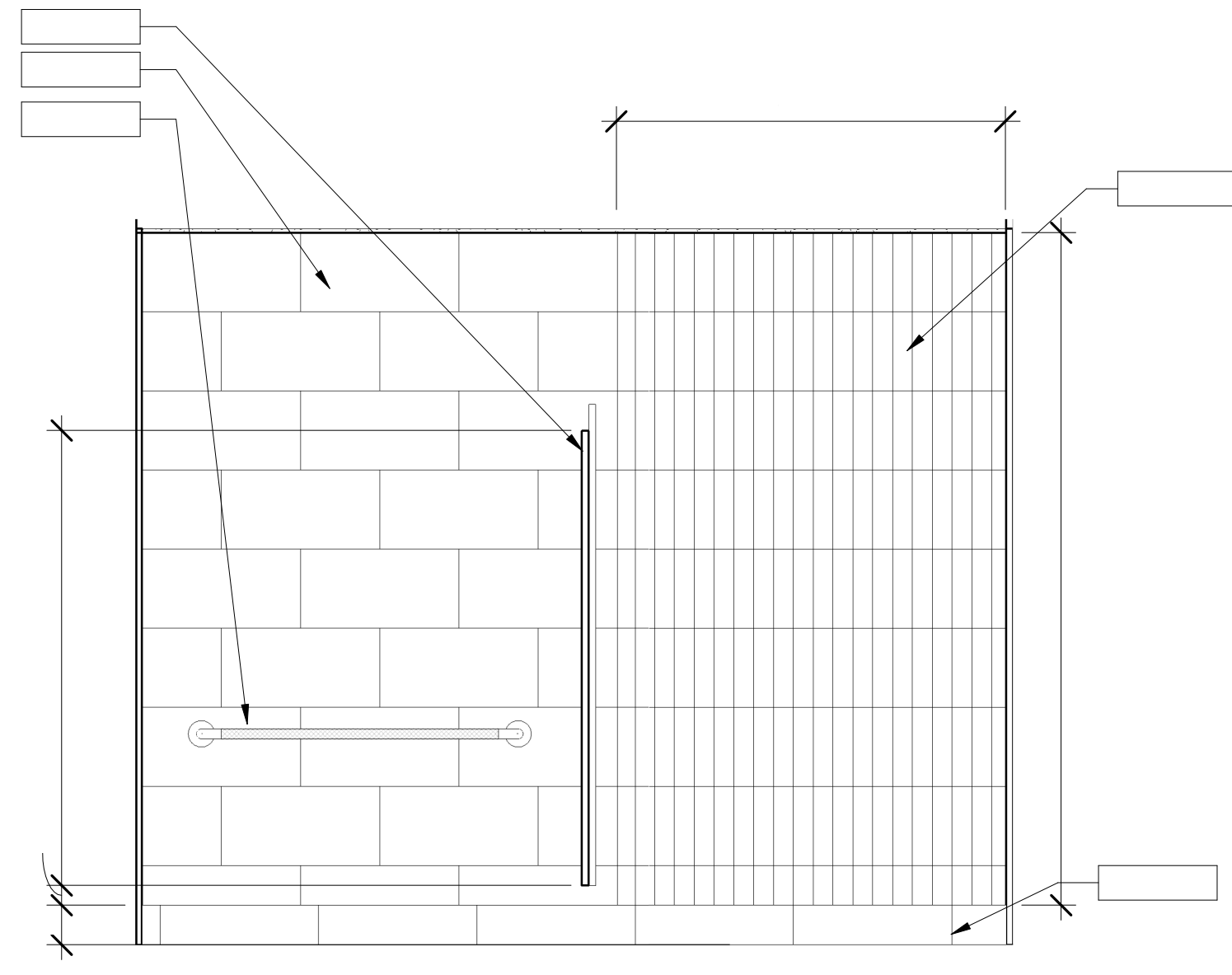
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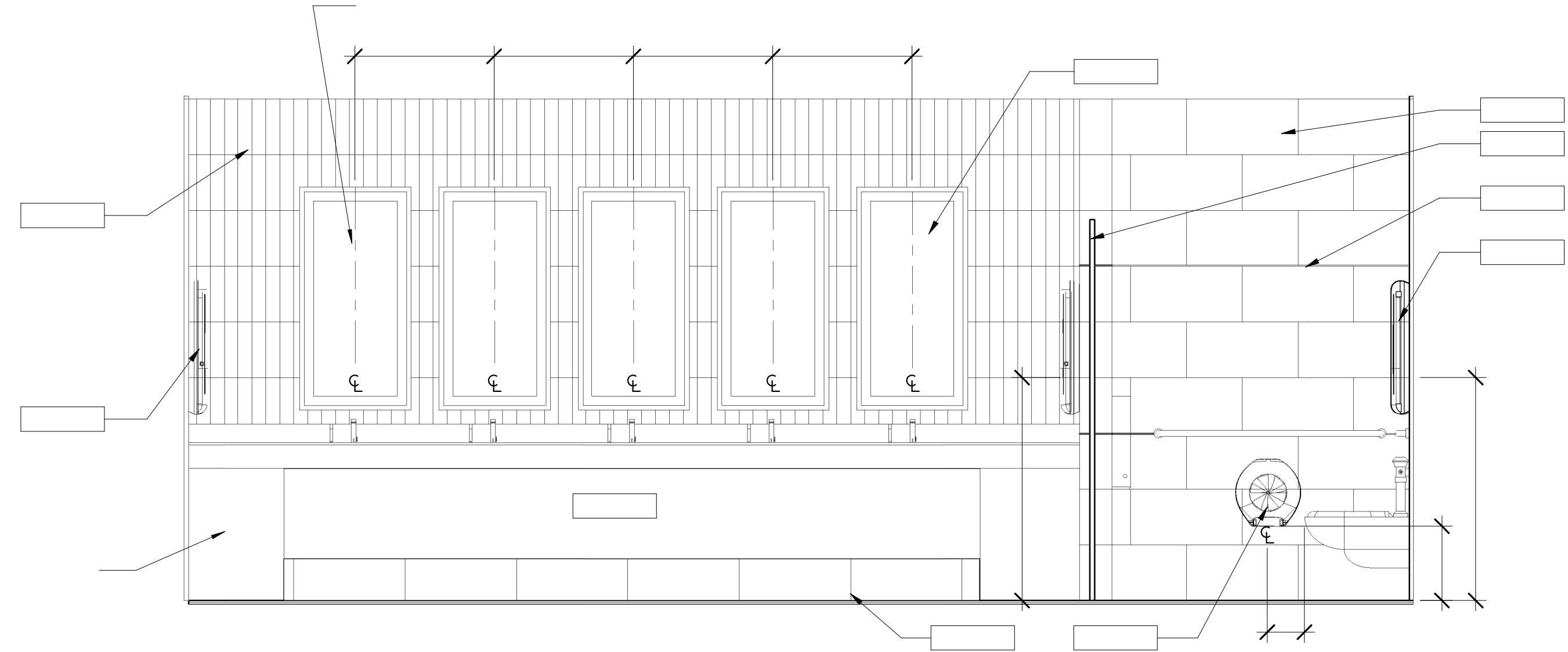
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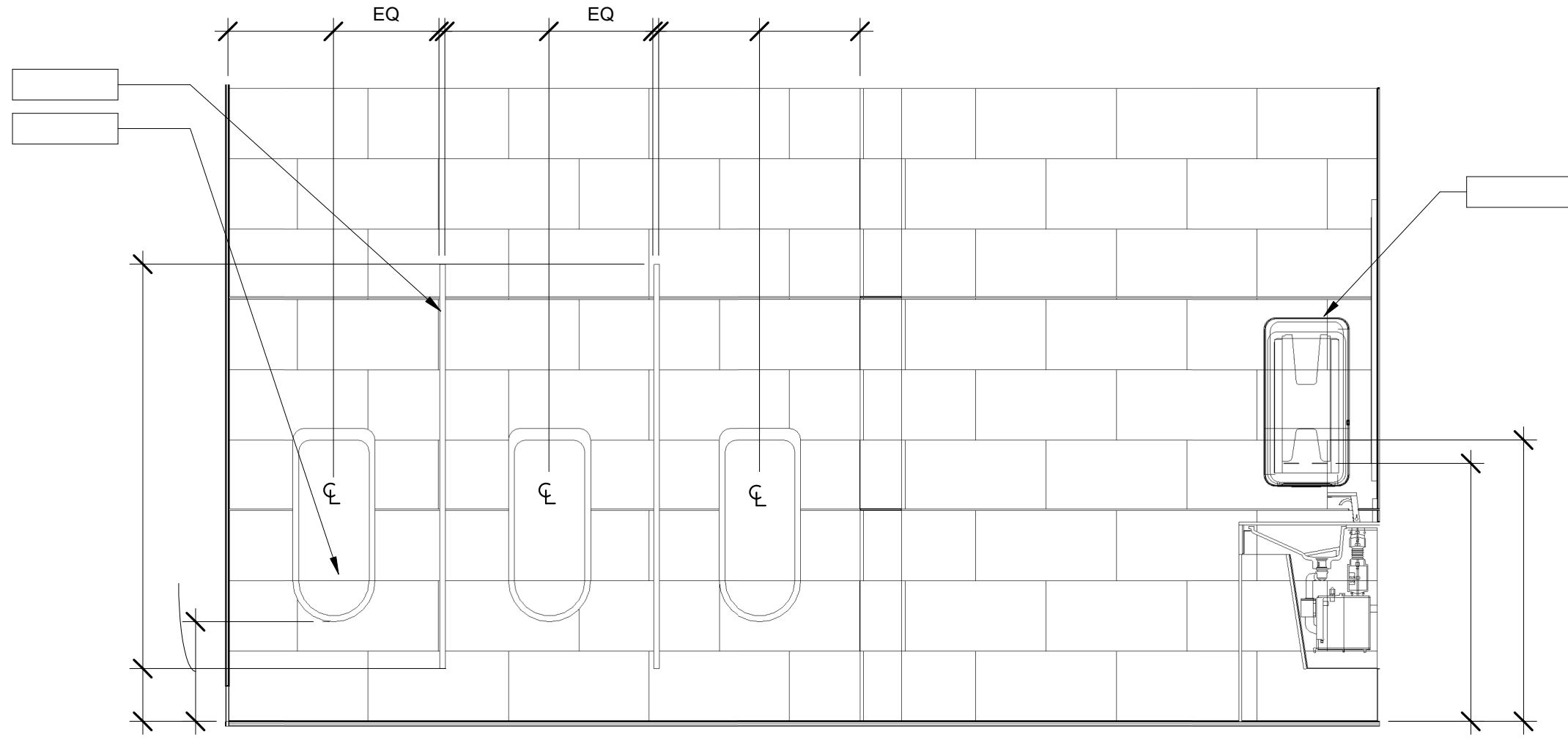
7 RESTROOM 2 - N. ELEV. a
 SCALE: 1/2" = 1'-0"



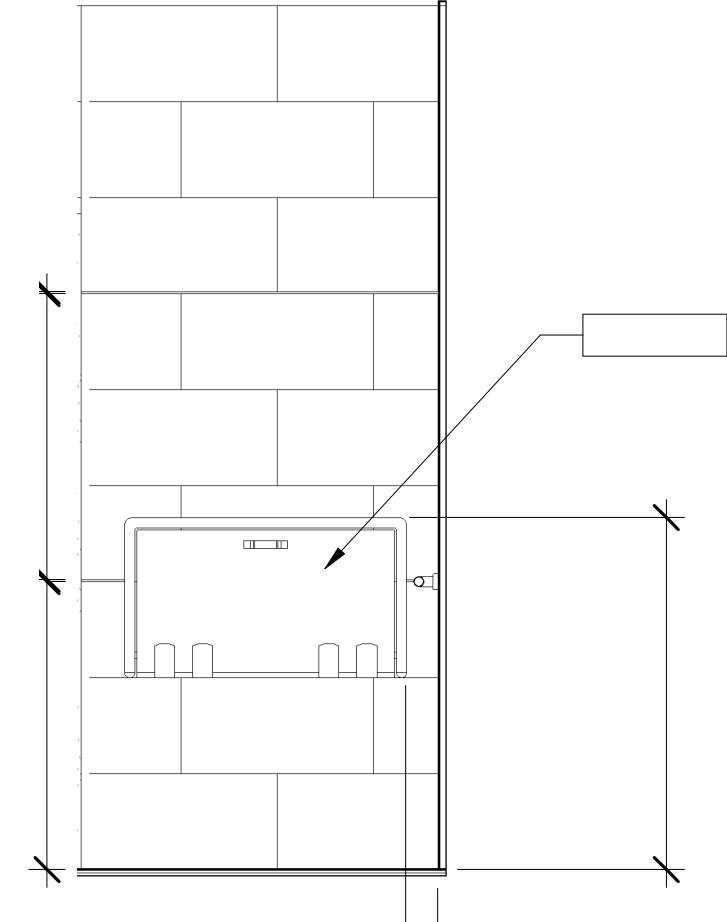
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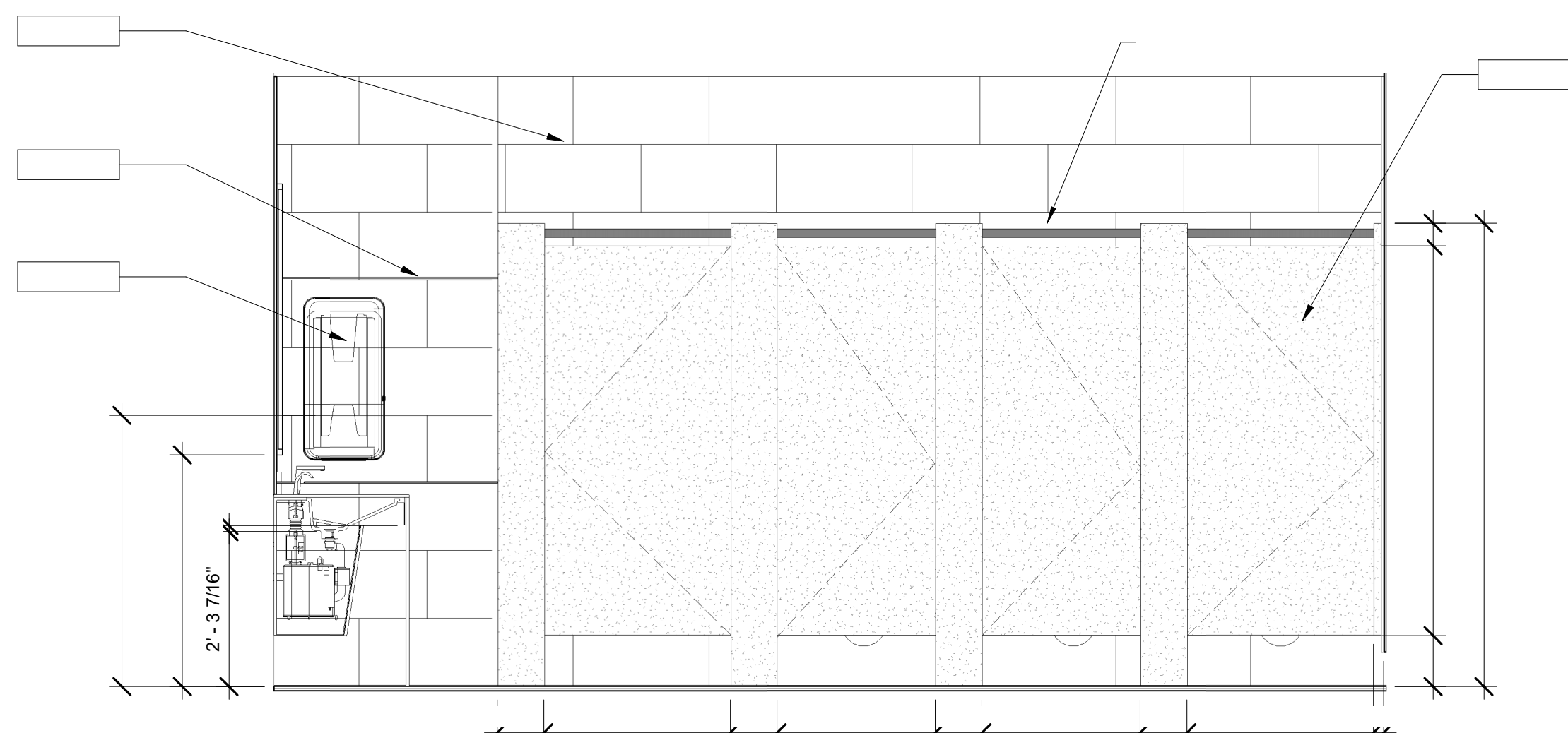
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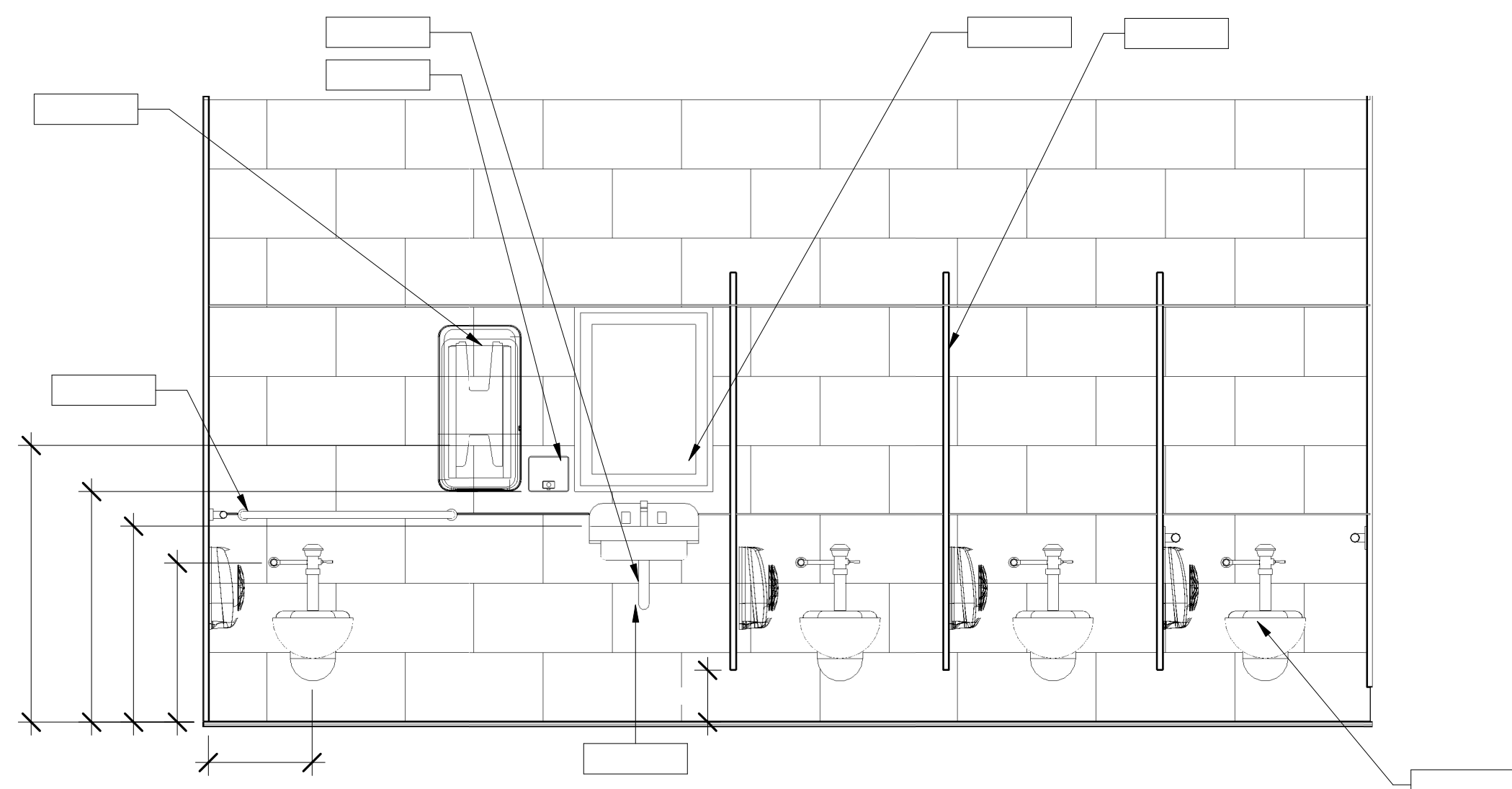
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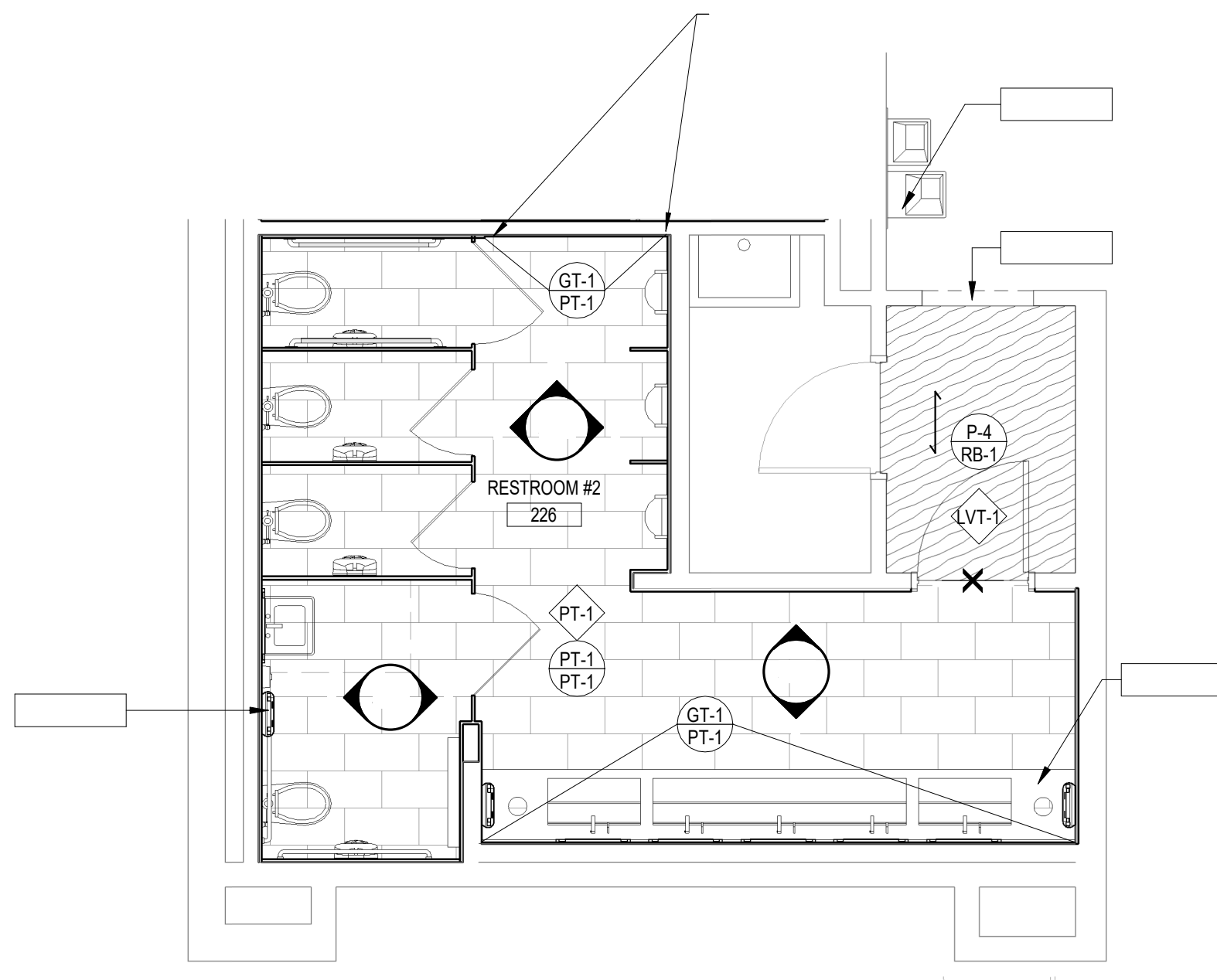
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 SCALE: 1/2" = 1'-0"



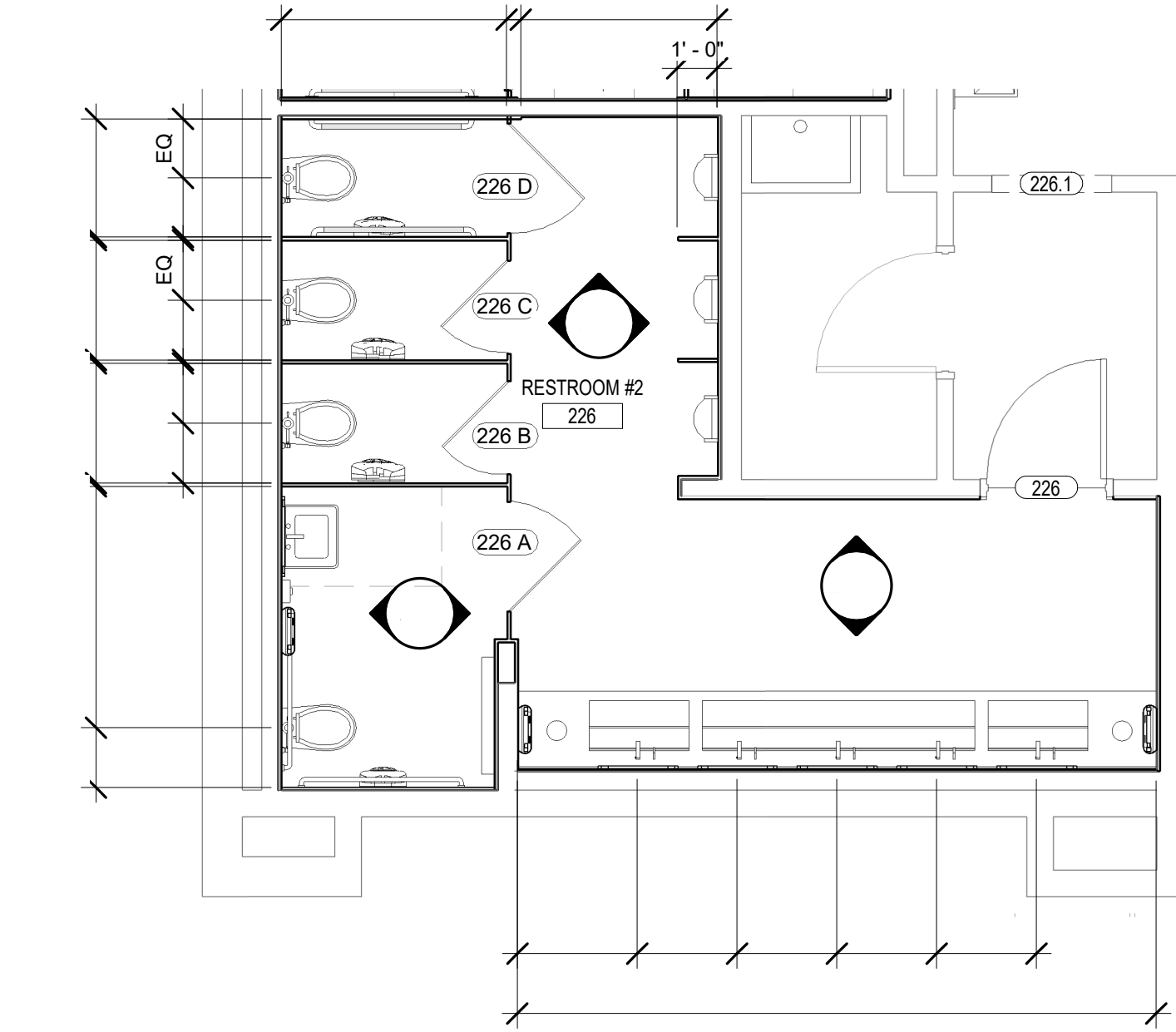
4 RESTROOM 2 - W. ELEV. b
 SCALE: 1/2" = 1'-0"



8 RESTROOM 2 - W. ELEV. a
 SCALE: 1/2" = 1'-0"



2 FINISH PLAN - RESTROOM 2
 SCALE: 1/4" = 1'-0"



1 DIMENSION PLAN - RESTROOM 2
 SCALE: 1/4" = 1'-0"

KEYNOTES	
NUMBER	DESCRIPTION
02.14	REMOVE, REFINISH AND REPLACE EXISTING DOOR. PROTECT EXISTING FRAME, REFINISH AND PAINT DOORS AND FRAMES. SW7019 GAUNTLET GRAY.
02.15	REMOVE EXISTING DOOR AND FRAME, REFINISH OPENING WITH GYP. BOARD AND PAINT
09.06	P-3 WATER RESISTANT PAINT SHERWIN WILLIAMS SW7757 HIGH REFLECTIVE WHITE FLAT (RESTROOM CEILING)
09.07	PT-1 PORCELAIN TILE: PORCELANOSA AVENUE GREY, 12X24, FINISH NATURAL
09.08	GT-1 GLASS TILE: BODESI GLASS TILE, 4X12 COLOR PEACOCK
09.09	GT-2 GLASS PENCIL LINER: ELIDA CERAMICA 12X0.51, GLOSSY (OR SIMILAR)
9.12	SS-3 SOLID SURFACE SINK SYSTEM WITH 3 STATION TROUGH, 2 INDIVIDUAL TROUGHS, AND 2 TRASH RECEPTACLE CUTOUTS. MATERIAL: PORCELANOSA KRION SOLID SURFACE ROYAL+ SERIES ELEGANT WHITE 9165-67. MANUFACTURER AND INSTALL BY KRION
9.14	SS-2 SOLID SURFACE: PORCELANOSA KRION CARRARA DARK L105-09. HARDWARE BY KRION MANUFACTURER PROVIDED.
10.04	PROVIDE STANDARD PIPE WRAP AT LAV. FOR ANY EXPOSED INSTANCES. SEE PLUMBING FOR SPECIFICATION.
11.01	TORK HAND TOWEL DISPENSER, 562520, WHITE, OWNER PROVIDED, CONTRACTOR INSTALLED
11.02	TORK 3 ROLL BATH TISSUE ROLL DISPENSER, 565828, WHITE, OWNER PROVIDED, CONTRACTOR INSTALLED
11.03	MIRROR: PARIS MIRROR: LIGHTED MIRROR HARMONY: 24X48" LED 110V WIRING (Model # HARM243200K-24V)
11.04	MIRROR: PARIS MIRROR: LIGHTED MIRROR HARMONY: 24X32" LED 110V WIRING (Model # HARM243200K-24V)
11.05	ADA SOAP DISPENSER: OWNER FURNISHED, CONTRACTOR INSTALLED (SEE PLUMBING SPEC)
11.06	WATER COOLER SPECIFIED BY PLUMBING ENGINEER
11.07	GB: GRAB BAR (ADA HEIGHT) MOUNTED BETWEEN 33-36" AFF
11.08	CHANGING TABLE: KOALA KARE KB200-05, WHITE GRANITE: MOUNTED 24" AFF
11.09	ADA ADULT TOILET (WALL MOUNTED) (SEE PLUMBING SPECS)
11.10	ADA ADULT URINAL (WALL-MOUNTED) (SEE PLUMBING SPECS)

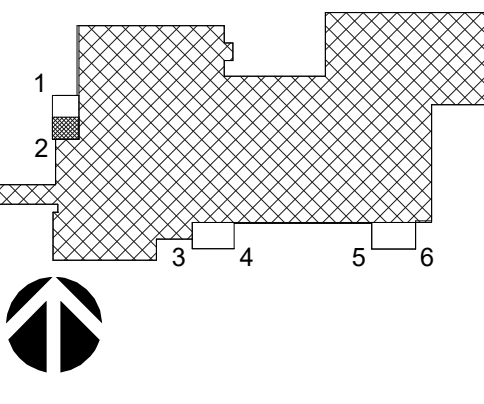


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BID DOCUMENTS

DESTIN FORT WALTON BEACH CONVENTION CENTER
HVAC UPGRADES & RESTROOM RENOVATIONS
 TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
 1250 MIRACLE STRIP PKWY SE
 FORT WALTON BEACH, FL 32548

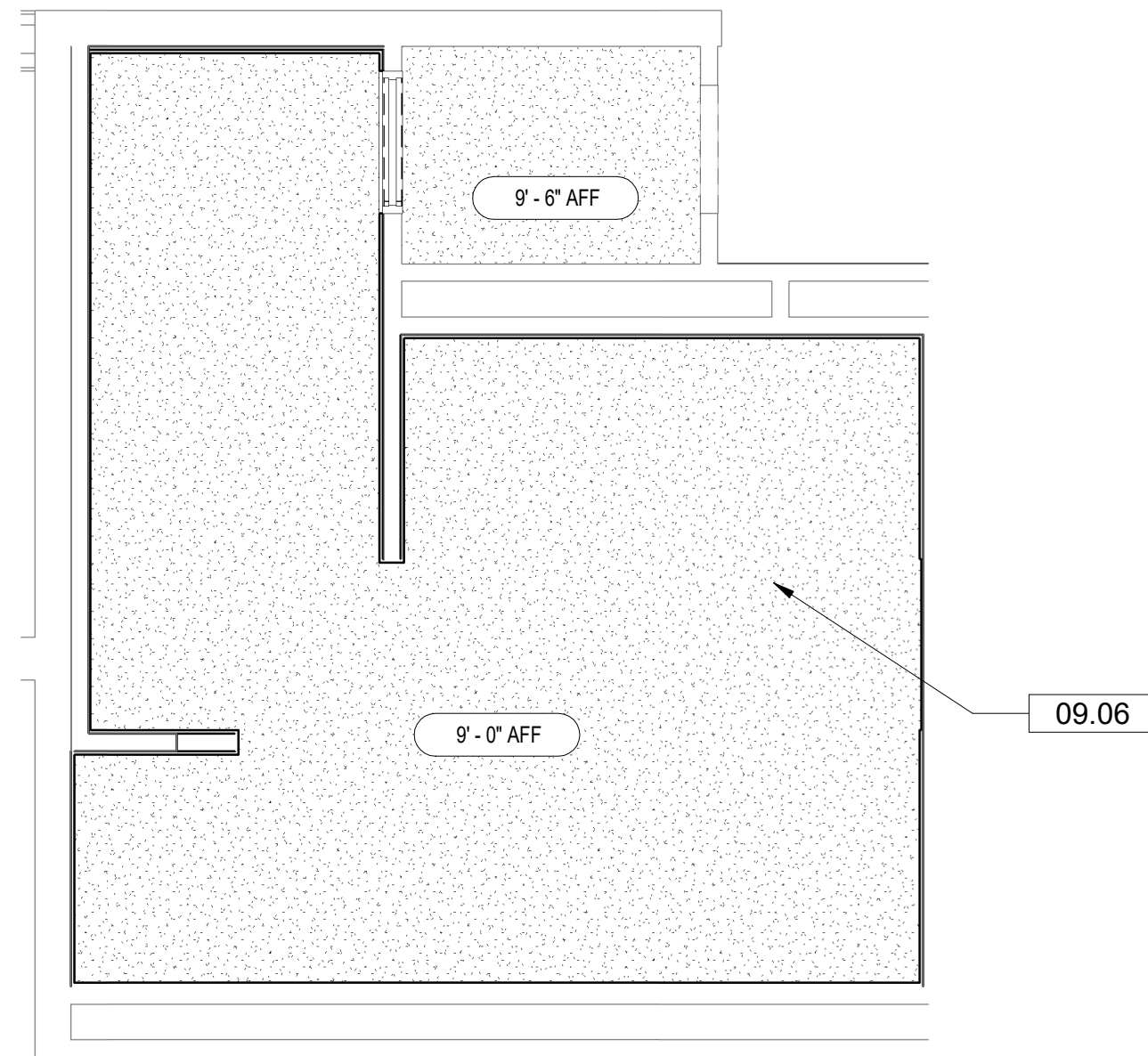


REVISIONS:		
No.	Description	Date

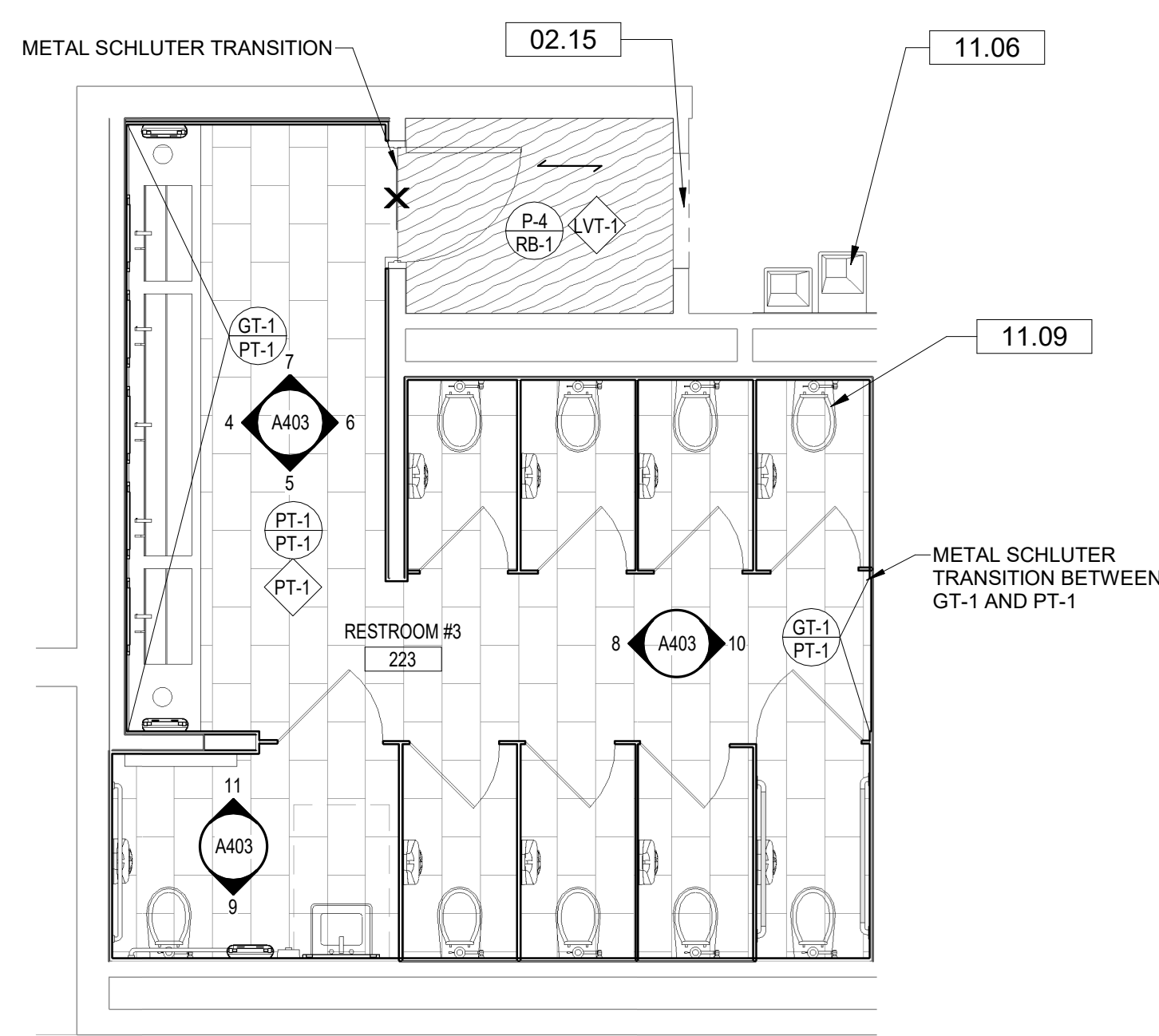
ENLARGED PLAN - RESTROOM 2

Project number	17057.8
Dated	04-12-21
PIC	Approver
PM	SLN

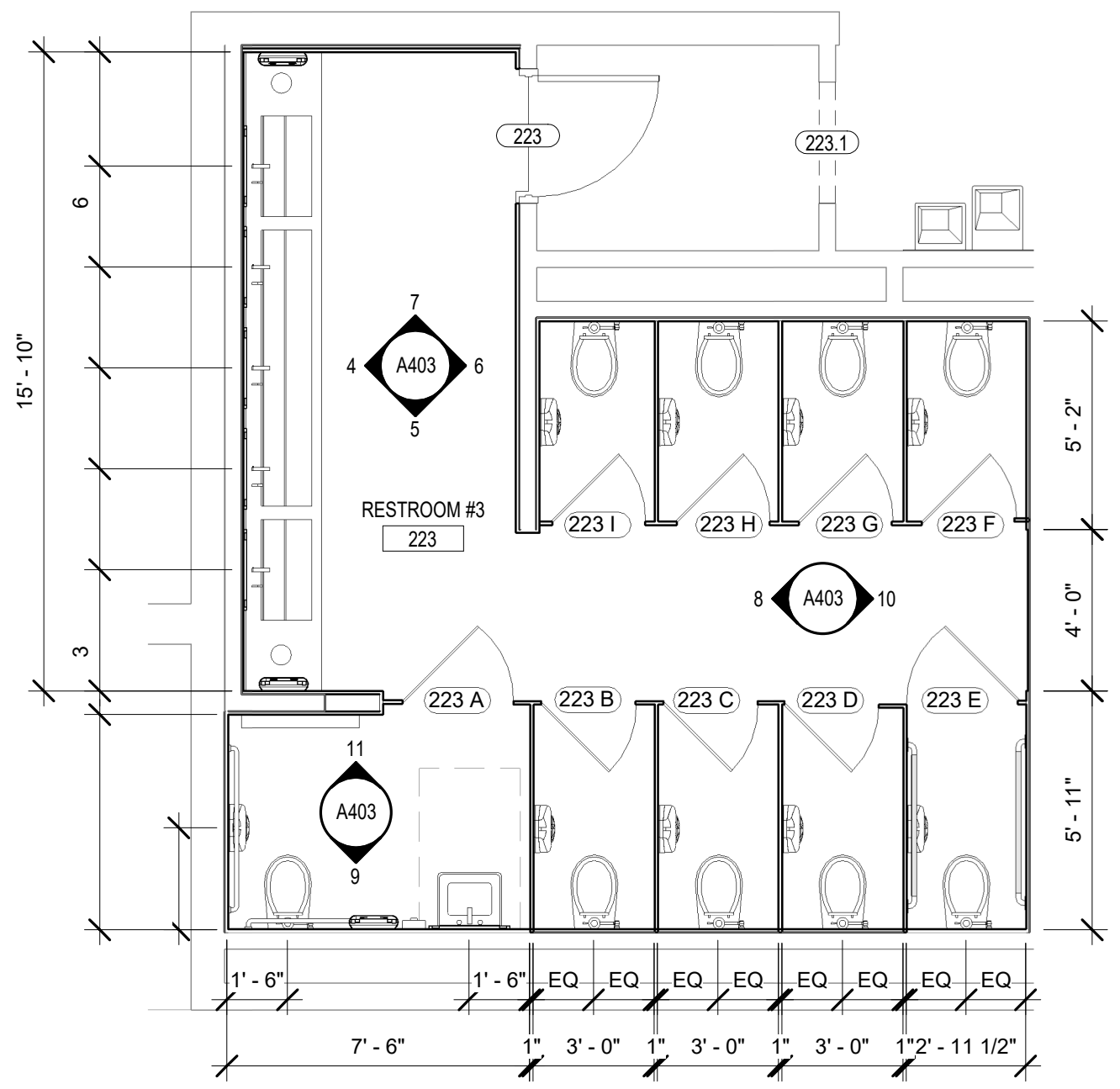
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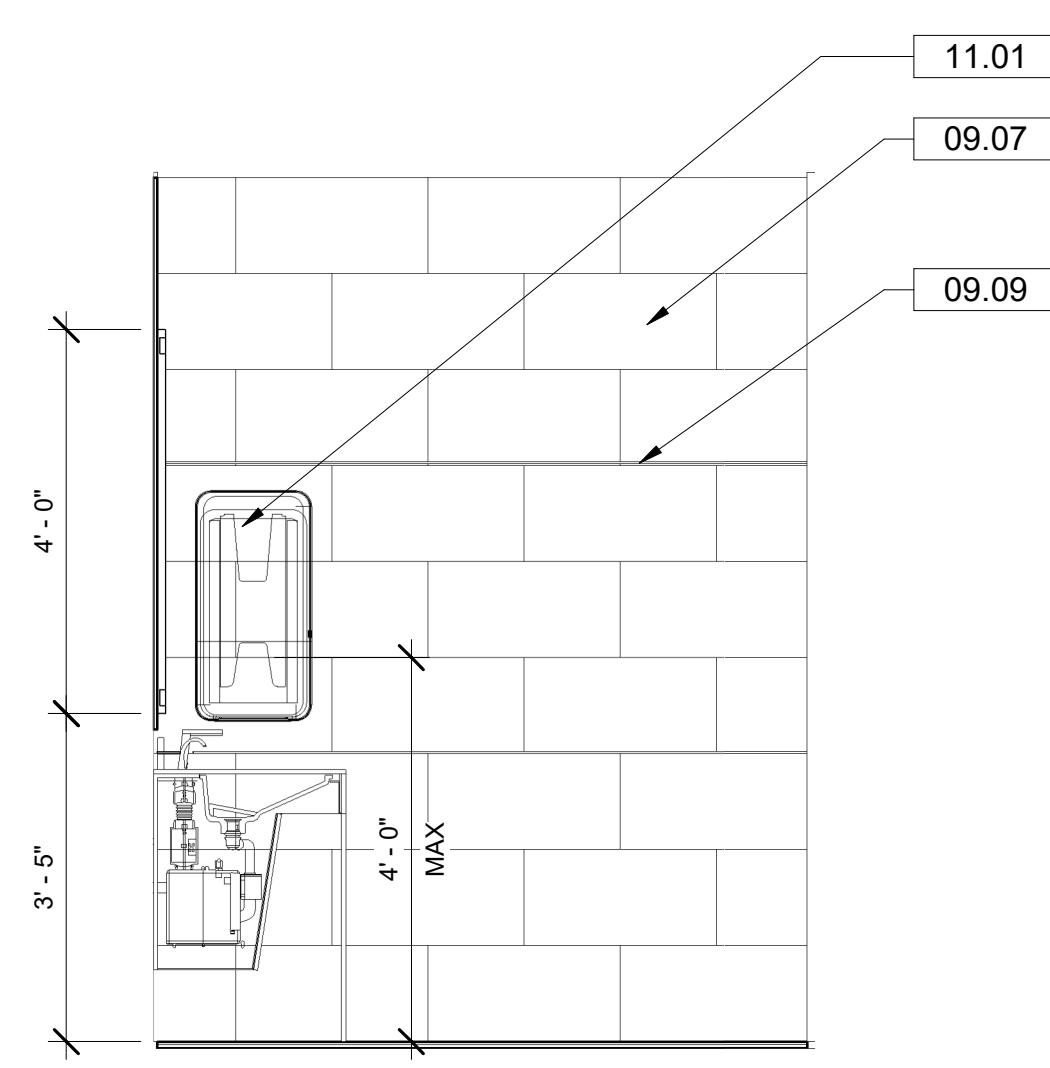
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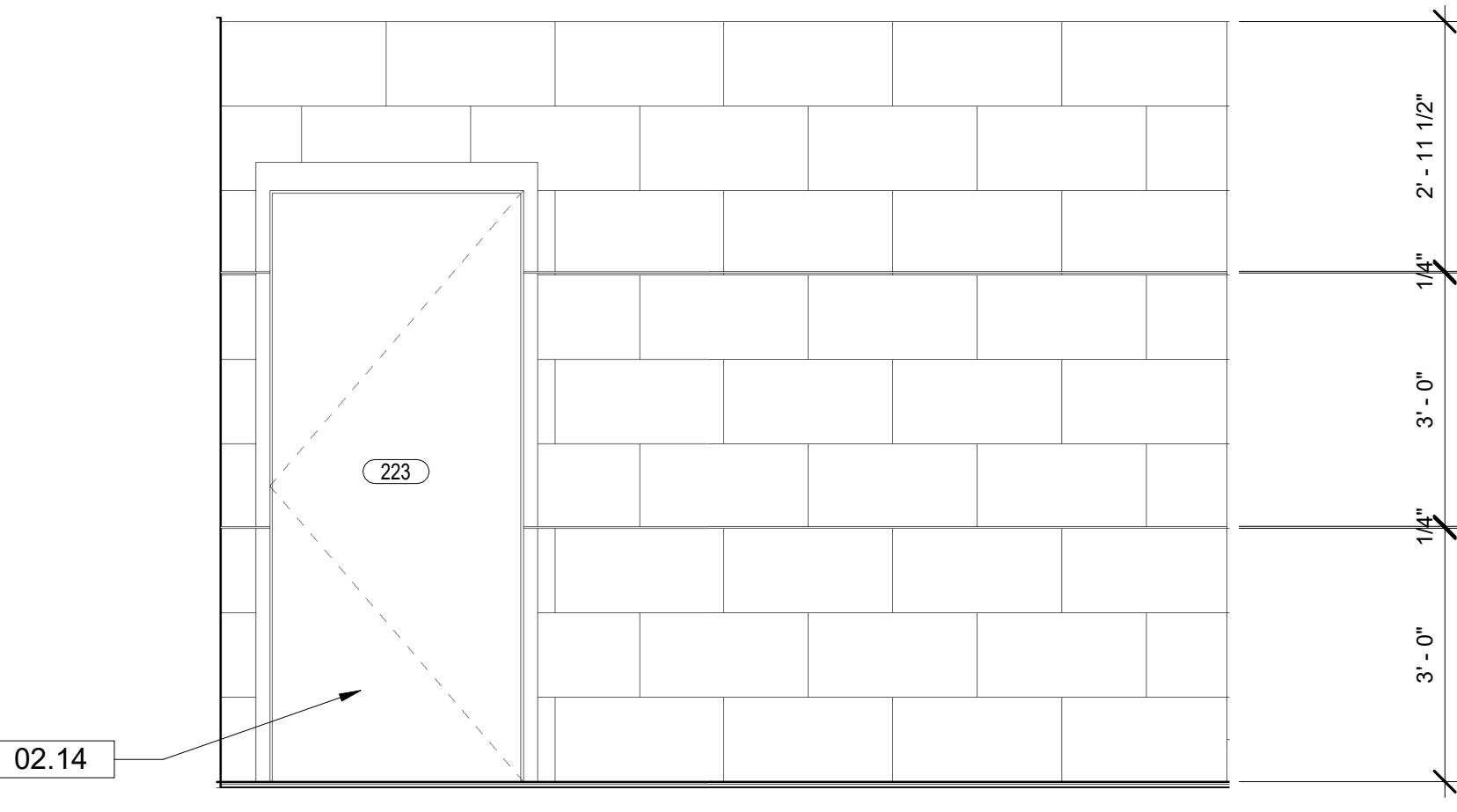
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SCALE: 1/4" = 1'-0"



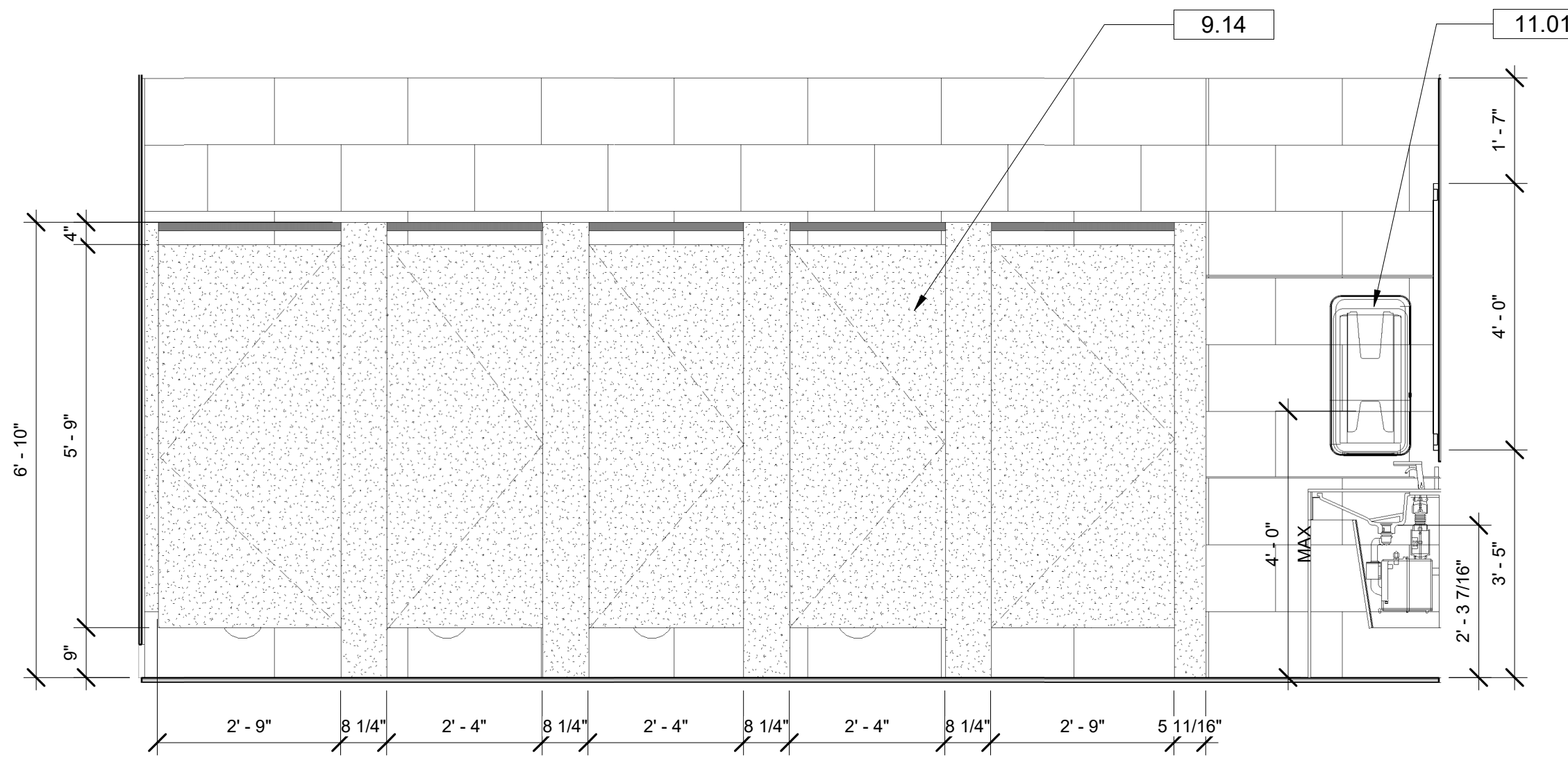
1 DIMENSION PLAN - RESTROOM 3
SCALE: 1/4" = 1'-0"



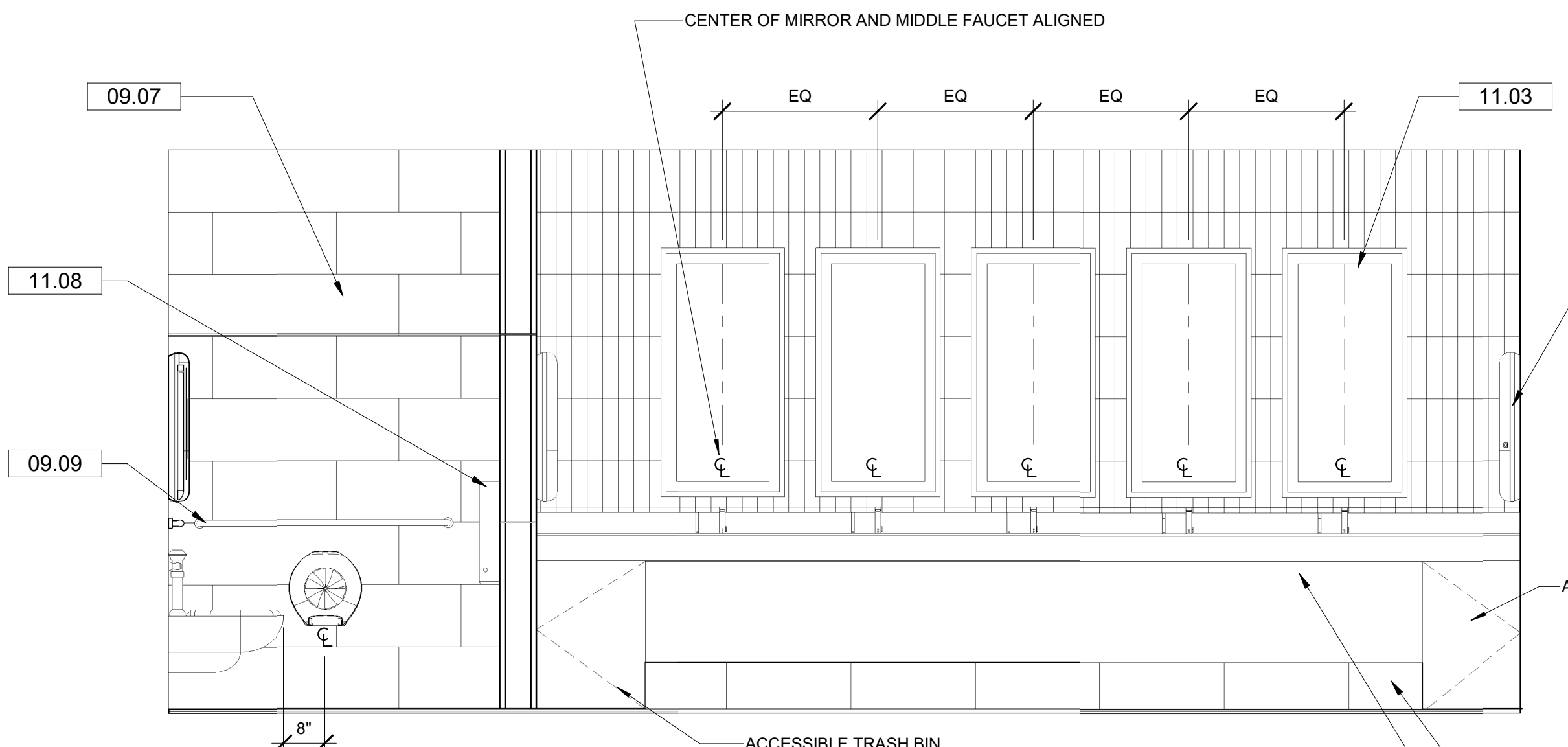
7 RESTROOM 3 - N. ELEV a
SCALE: 1/2" = 1'-0"



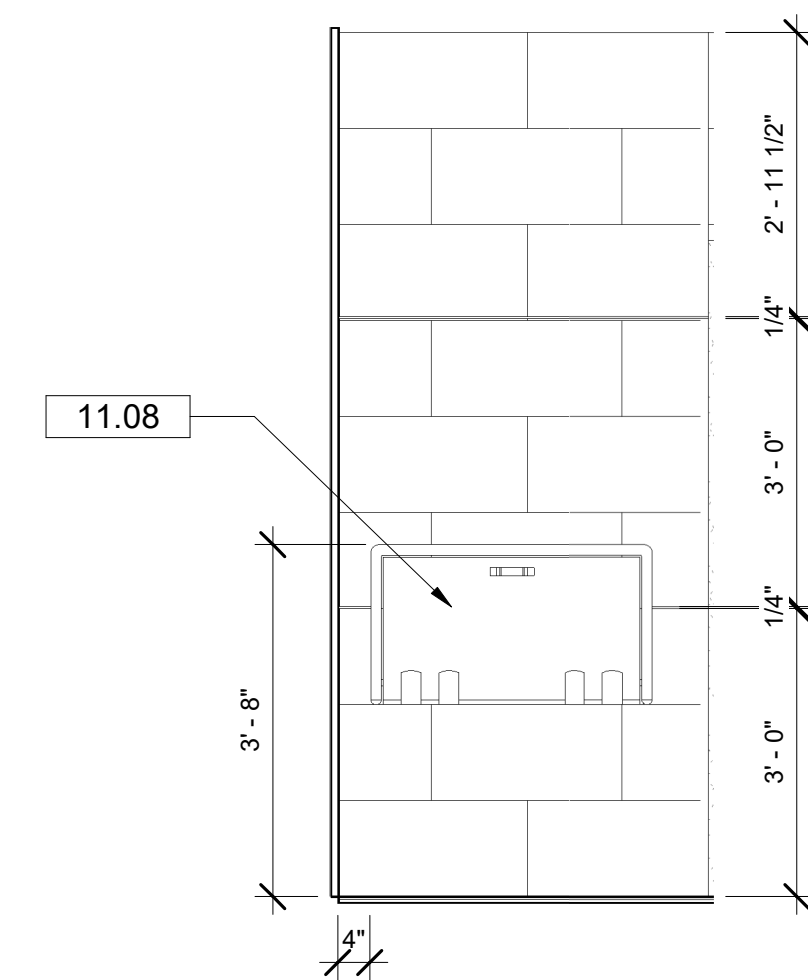
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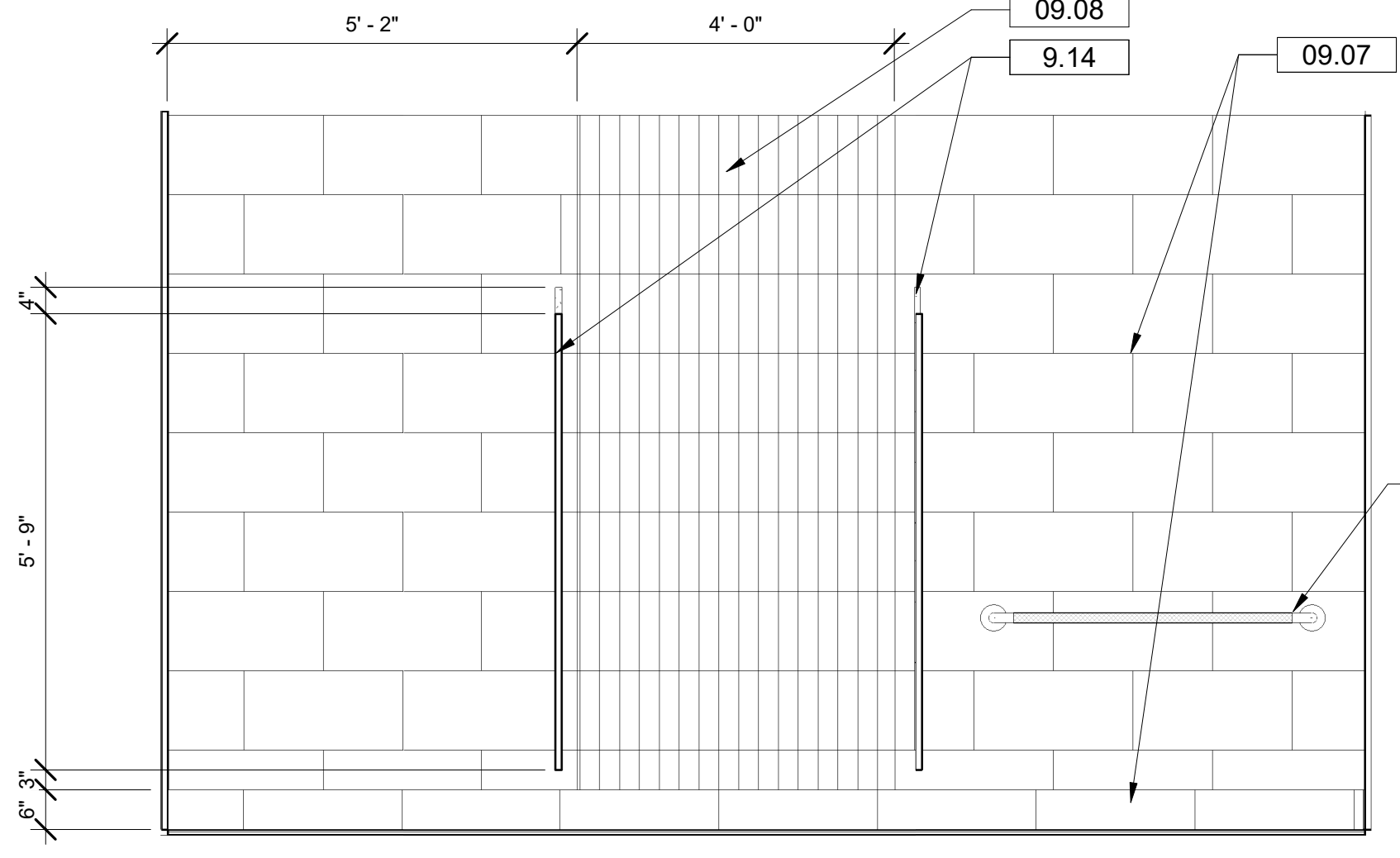
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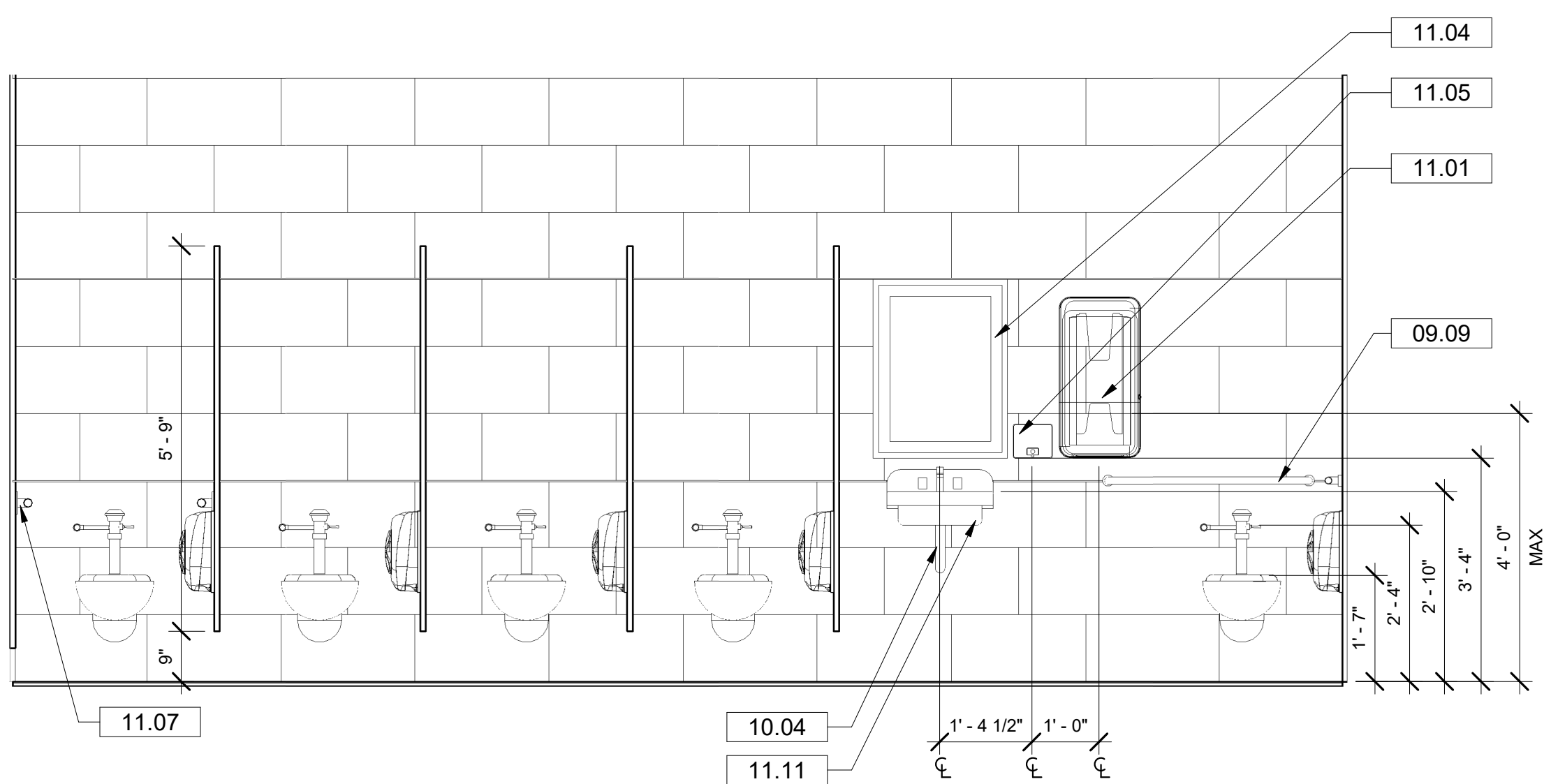
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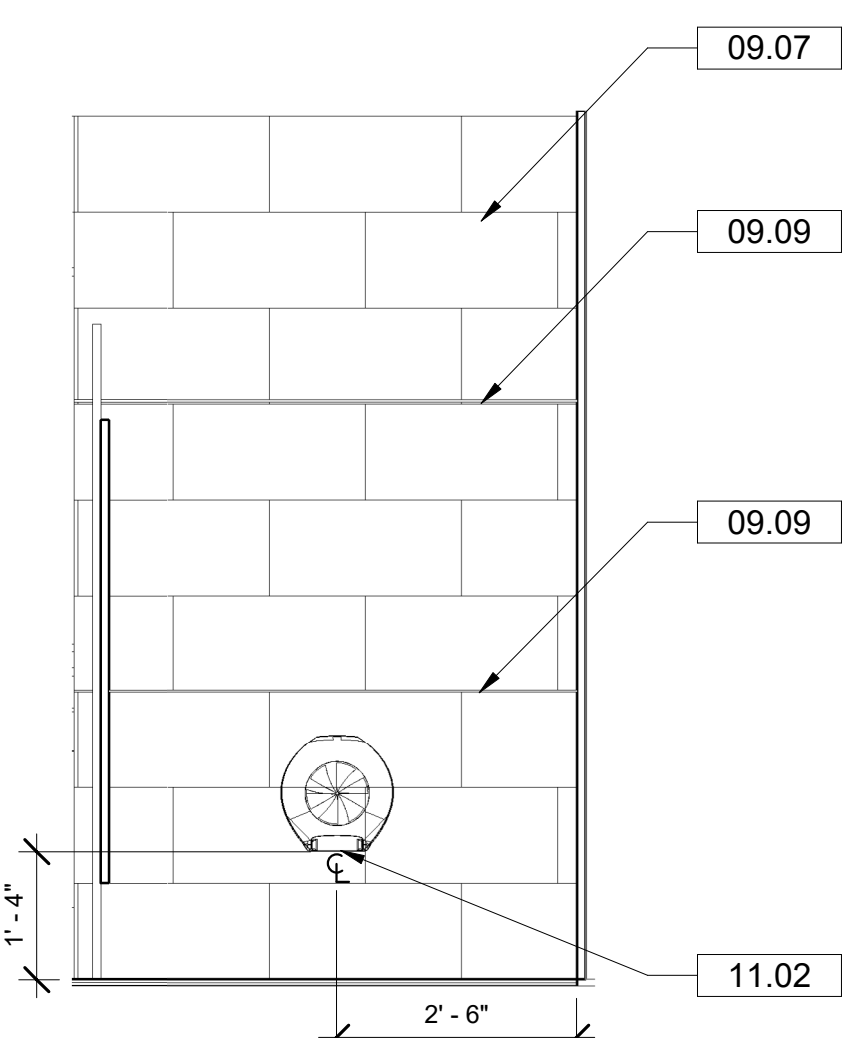
11 RESTROOM 3 - N. ELEV b
SCALE: 1/2" = 1'-0"



10 RESTROOM 3 - E. ELEV b
SCALE: 1/2" = 1'-0"



9 RESTROOM 3 - S. ELEV b
SCALE: 1/2" = 1'-0"



8 RESTROOM 3 - W. ELEVATION b
SCALE: 1/2" = 1'-0"

GEN. NOTES: ENLG. PLAN

1. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO PERFORMING NEW WORK.
2. THE CONTRACTOR SHALL PROVIDE BLOCKING OR BACKING AS REQUIRED FOR WALL-MOUNTED AND CEILING MOUNTED EQUIPMENT.
3. CONTRACTOR SHALL COORDINATE WORK WITH MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS.
4. REFER TO FINISH LEGEND ON SHEET A400 FOR MORE INFORMATION ABOUT FINISHES SHOWN ON THIS SHEET.
5. PROVIDE POSITIVE SLOPE TOWARDS ALL FLOOR DRAINS.
6. STALL DOORS SHOWN IN ENLARGED FLOORPLANS AS A-H FOR PARTITION HARDWARE COORDINATION ONLY. NOT RELEVANT TO DOOR SCHEDULE.
7. AUTOMATIC SOAP DISPENSER AND FAUCET SPECIFIED BY PLUMBING ENGINEER.

GENERAL NOTES: RCP

1. SEE SHEET A400 FOR ROOM FINISH SCHEDULE FOR ADDITIONAL INFORMATION.
2. ALL ACCESS PANEL LOCATIONS TO BE COORDINATED WITH MECHANICAL, ELECTRICAL, PLUMBING AND FIRE SPRINKLER WORK.
3. REPLACE CEILING AT NEW HEIGHT IN RESTROOMS #1 TO #6.
4. SEE ELECTRICAL FOR LIGHTING FIXTURE SCHEDULE.
5. WHERE APPLICABLE, ALL FIRE SPRINKLER HEADS AND ELECTRICAL FIXTURES SHALL BE CENTERED WITHIN CEILING TILES.
6. IF ANY ITEMS INDICATED ON THE DRAWINGS ARE IN CONFLICT WITH ONE ANOTHER, CONTRACTOR IS RESPONSIBLE FOR BRINGING TO ARCHITECT FOR FURTHER CLARIFICATION ON DESIGN INTENT.

KEYNOTES

NUMBER	DESCRIPTION
02.14	REMOVE, REFINISH AND REPLACE EXISTING DOOR, PROTECT EXISTING FRAME, REFINISH AND PAINT DOORS AND FRAMES - SW7019 GAUNTLET GRAY.
02.15	REMOVE EXISTING DOOR AND FRAME, REFINISH OPENING WITH GYP. BOARD AND PAINT.
09.06	F-3 WATER RESISTANT PAINT SHERWIN WILLIAMS SW7757 HIGH REFLECTIVE WHITE FLAT (RESTROOM CEILING)
09.07	PT-1 PORCELAIN TILE: PORCELANOSA AVENUE GREY, 12X24, FINISH NATURAL
09.08	GT-1 GLASS TILE: BODESI GLASS TILE, 4X12 COLOR PEACOCK
09.09	GT-2 GLASS PENCIL LINER: ELIDA CERAMICA 12X0.51, GLOSSY (OR SIMILAR)
9.12	SS-3 SOLID SURFACE SINK SYSTEM WITH 3 STATION TROUGH, 2 INDIVIDUAL TROUGHS, AND 2 TRASH RECEPTACLE CUTOUTS. MATERIAL: PORCELANOSA KRION SOLID SURFACE ROYAL+ SERIES ELEGANT WHITE 9105-G7 MANUFACTURER AND INSTALL BY KRION
9.14	SS-2 SOLID SURFACE: PORCELANOSA KRION CARRARA DARK L105-09. HARDWARE BY KRION MANUFACTURER PROVIDED
10.04	PROVIDE STANDARD PIPE WRAP AT LAV. FOR ANY EXPOSED INSTANCES. SEE PLUMBING FOR SPECIFICATION.
11.01	TORK HAND TOWEL DISPENSER, 55520, WHITE, OWNER PROVIDED, CONTRACTOR INSTALLED
11.02	TORK 3 ROLL BATH TISSUE ROLL DISPENSER, 56828, WHITE, OWNER PROVIDED, CONTRACTOR INSTALLED
11.03	MIRROR: PARIS MIRROR, LIGHTED MIRROR HARMONY, 24X48" LED 110V WIRING (Model # HARM4824300K-24V)
11.04	MIRROR: PARIS MIRROR, LIGHTED MIRROR HARMONY, 24X32" LED 110V WIRING (Model # HARM2432300K-24V)
11.05	ADA SOAP DISPENSER, OWNER FURNISHED, CONTRACTOR INSTALLED (SEE PLUMBING SPEC)
11.06	WATER COOLER SPECIFIED BY PLUMBING ENGINEER
11.07	GB: GRAB BAR (ADA HEIGHT) MOUNTED BETWEEN 33-36" AFF
11.08	CHANGING TABLE: KOALA KARE KB200-05, WHITE GRANITE, MOUNTED 24" AFF
11.09	ADA ADULT TOILET (WALL MOUNTED) (SEE PLUMBING SPECS)
11.11	ADA LAVATORY SPECIFIED BY PLUMBING ENGINEER

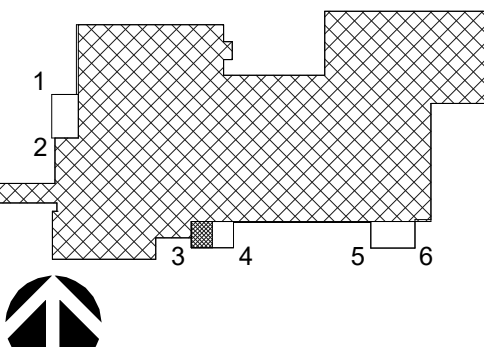


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PURSUANT TO FLORIDA STATUTES, SECTION 550.003, AN INDIVIDUAL EMPLOYEE OR AGENT MAY NOT BE HELD INDIVIDUALLY LIABLE FOR NEGLIGENCE.

BID DOCUMENTS

DESTIN FORT WALTON BEACH CONVENTION CENTER
HVAC UPGRADES & RESTROOM RENOVATIONS
TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
1250 MIRACLE STRIP PKWY SE
FORT WALTON BEACH, FL 32548



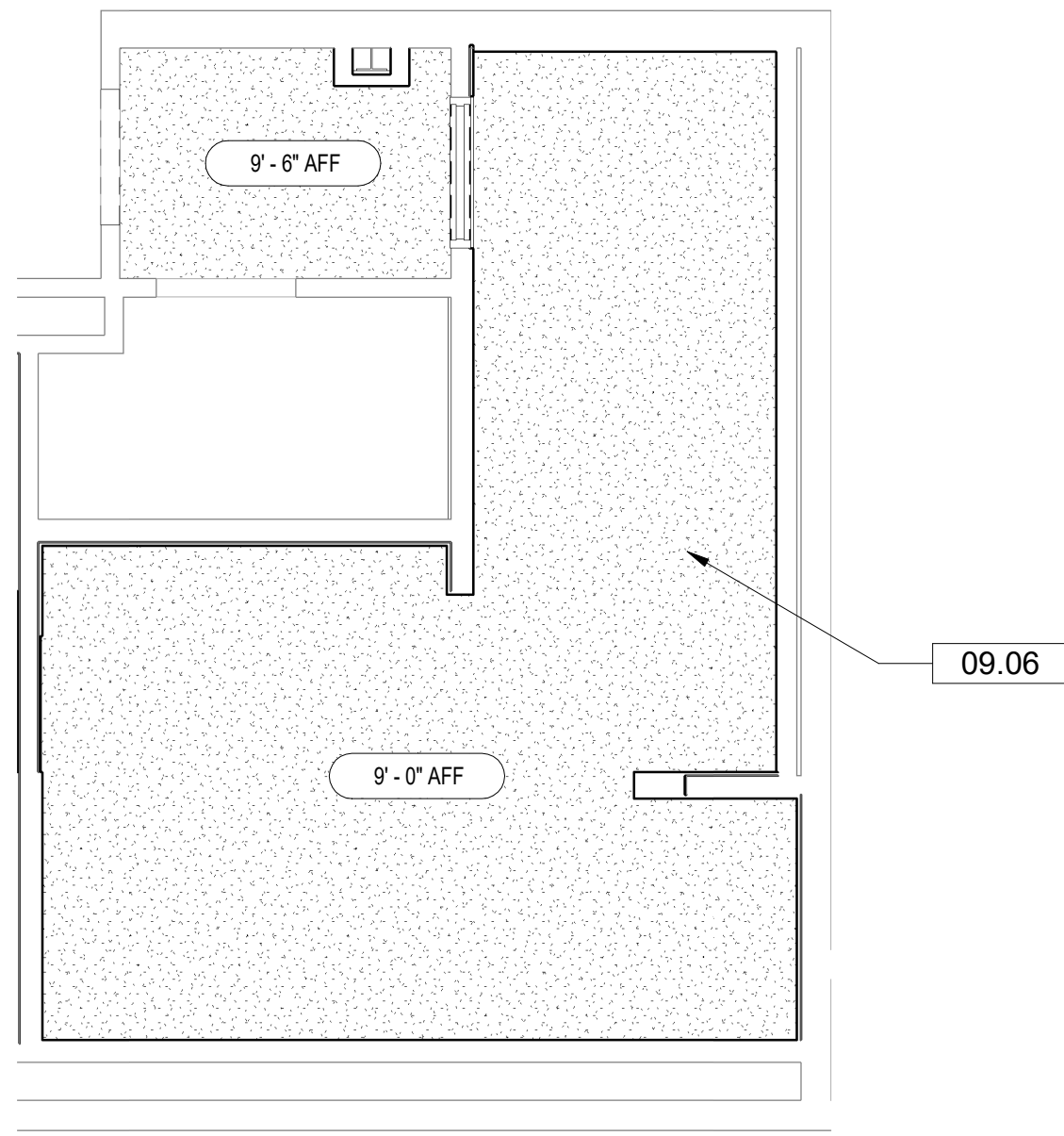
REVISIONS:

No.	Description	Date

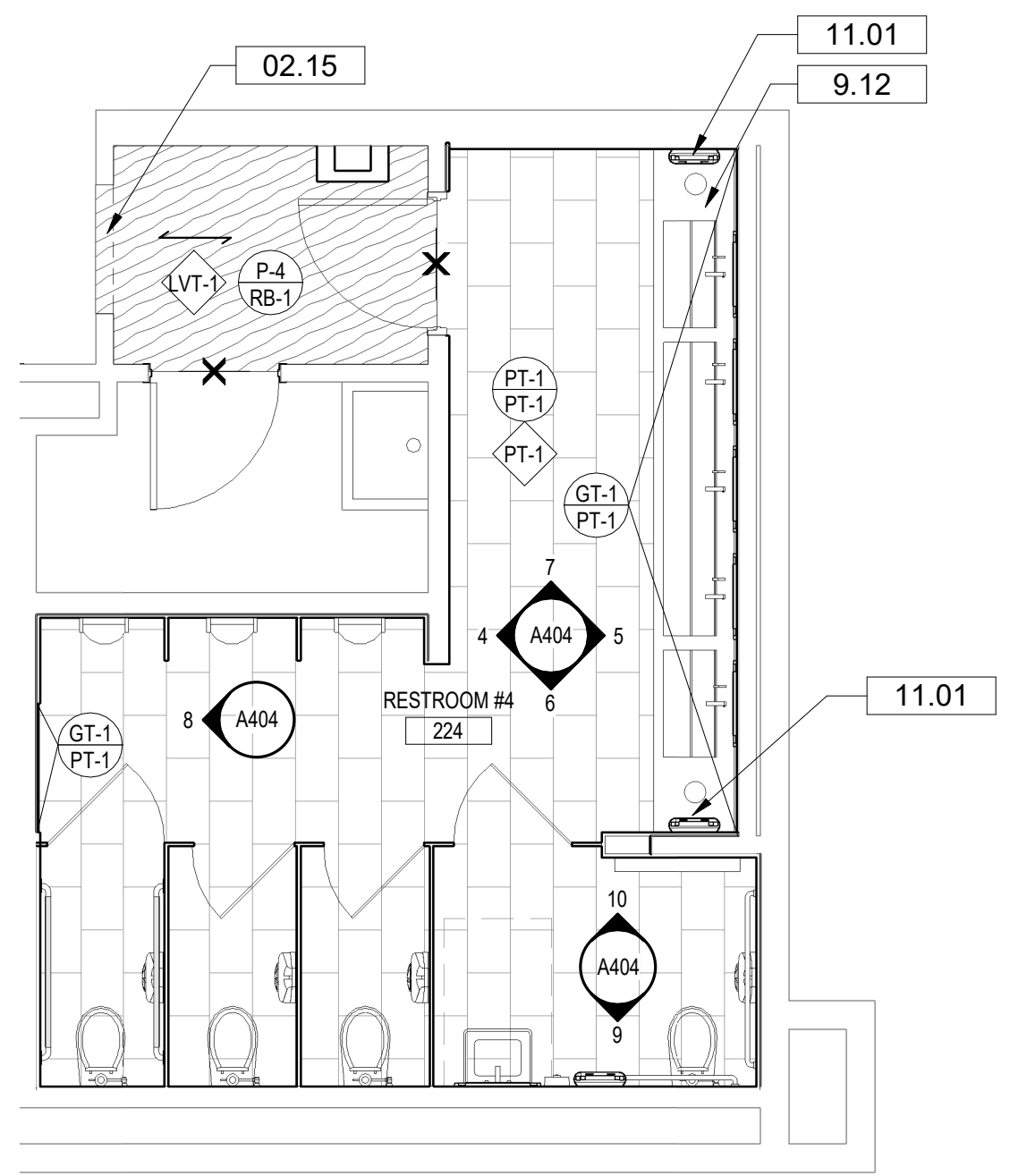
ENLARGED PLAN - RESTROOM 3

Project number	17057.8
Dated	04-12-21
PIC	Approver
PM	SLN

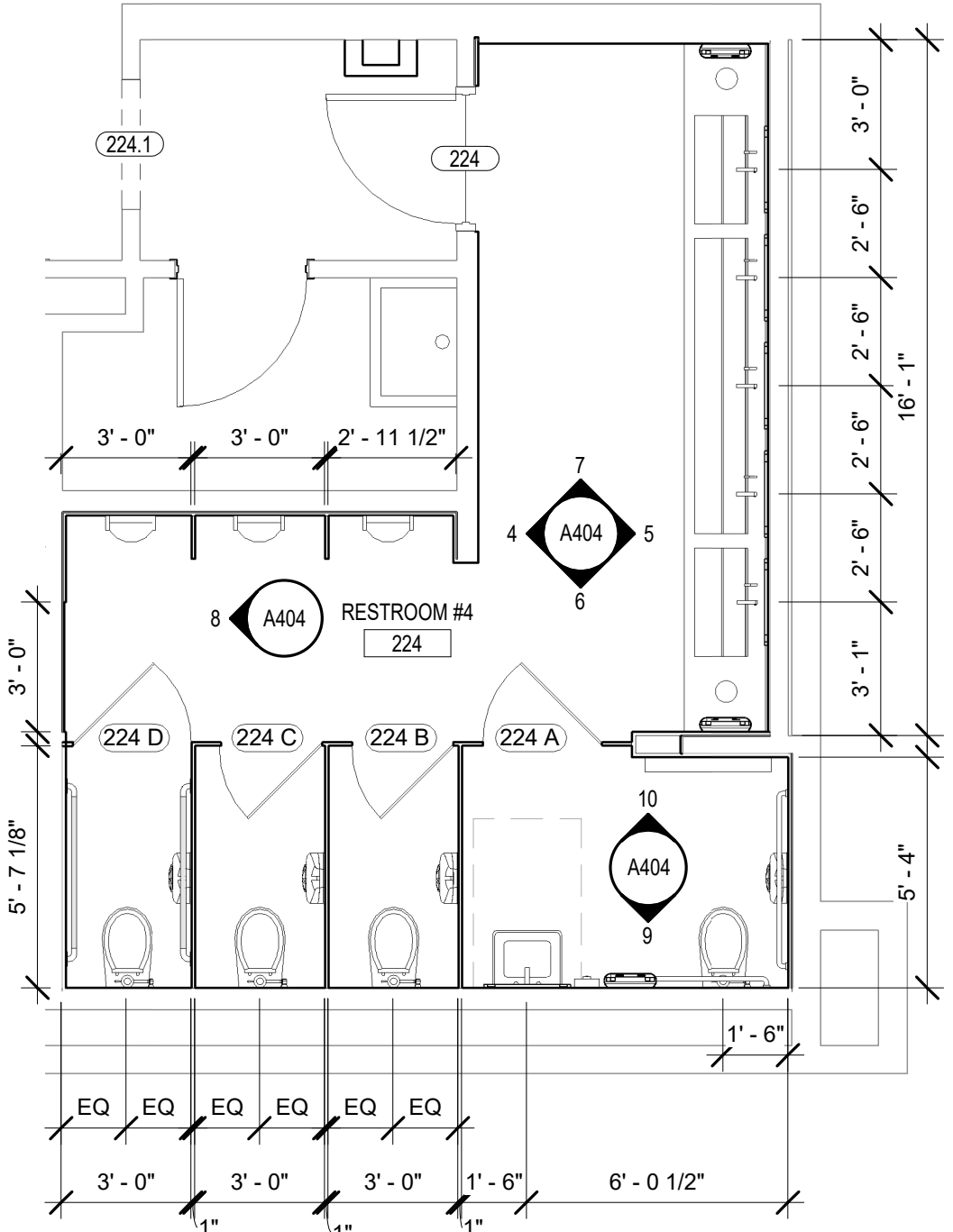
A403
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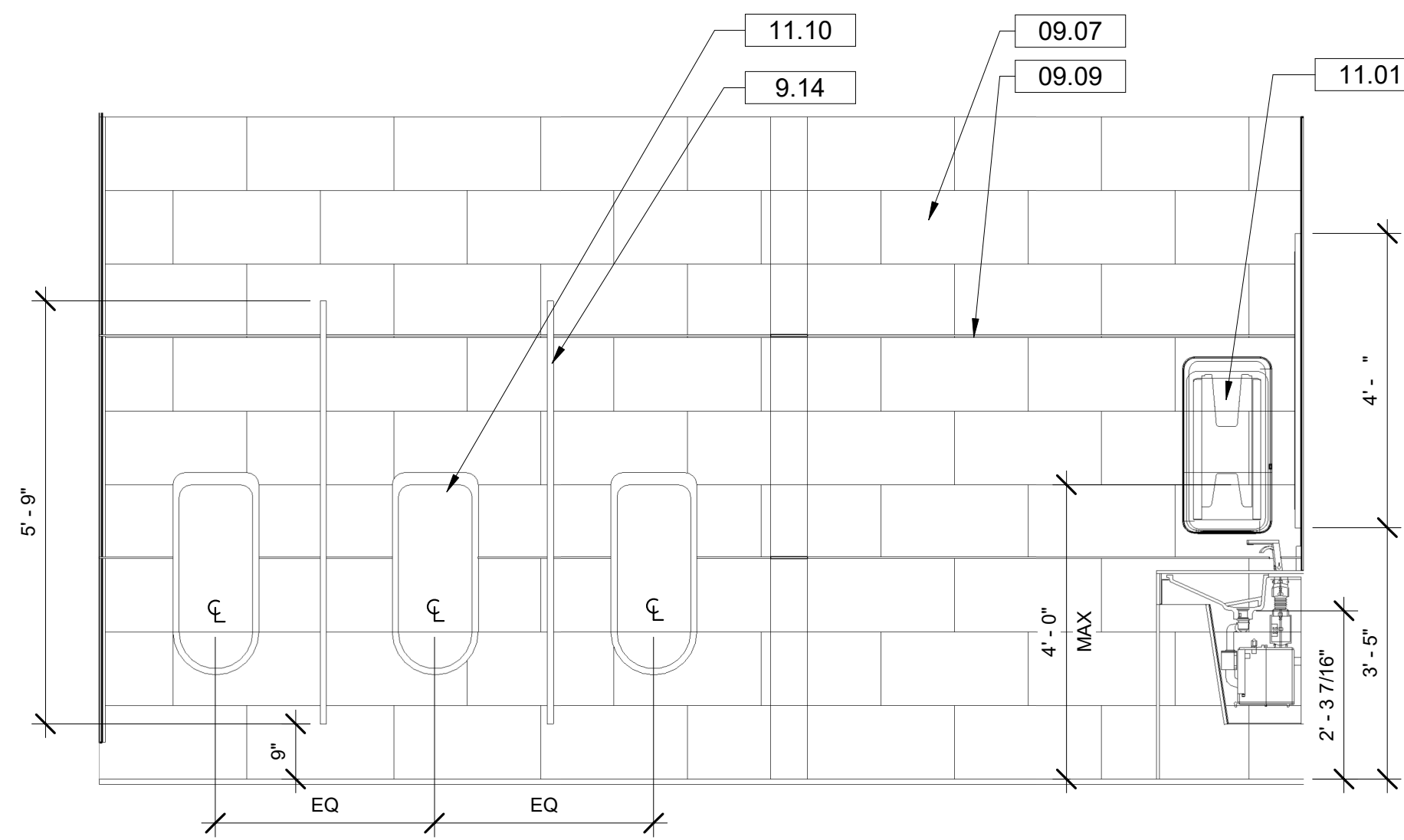
3 RCP - RESTROOM 4
 SCALE: 1/4" = 1'-0"



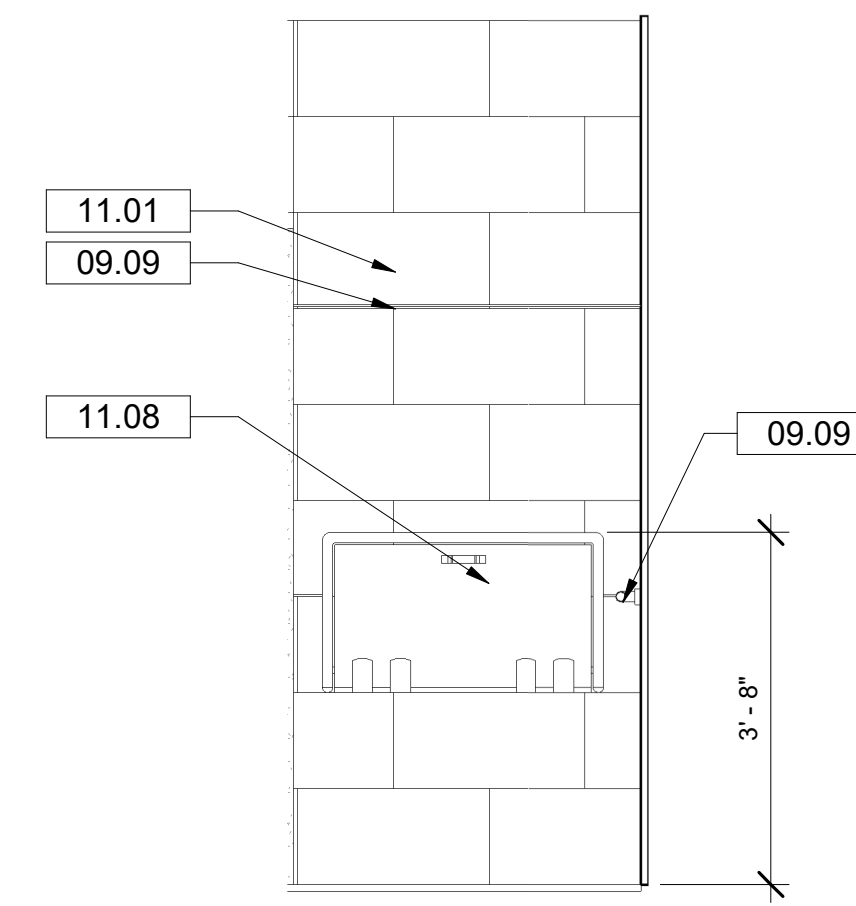
2 FINISH PLAN - RESTROOM 4
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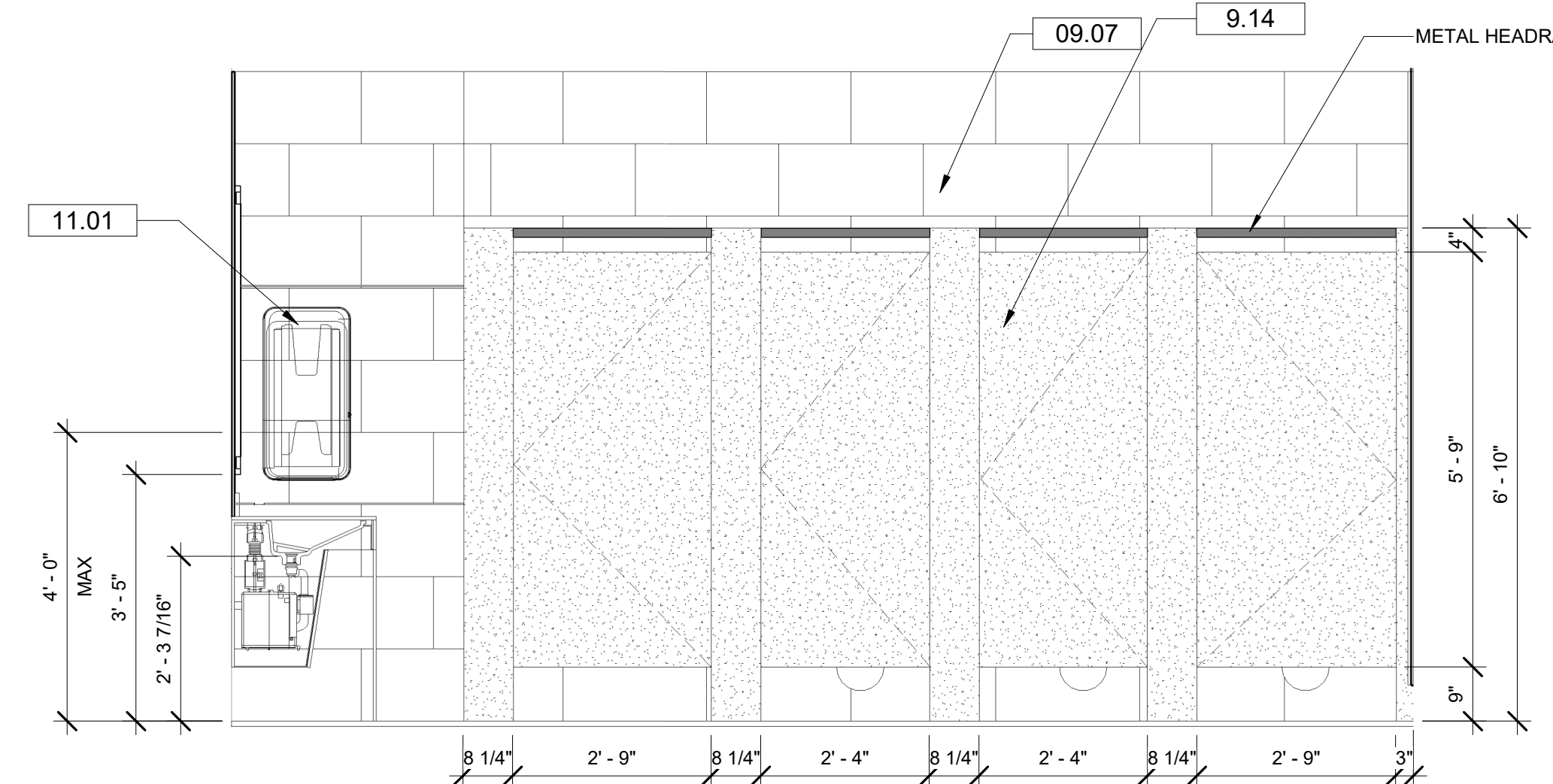
1 DIMENSION PLAN - RESTROOM 4
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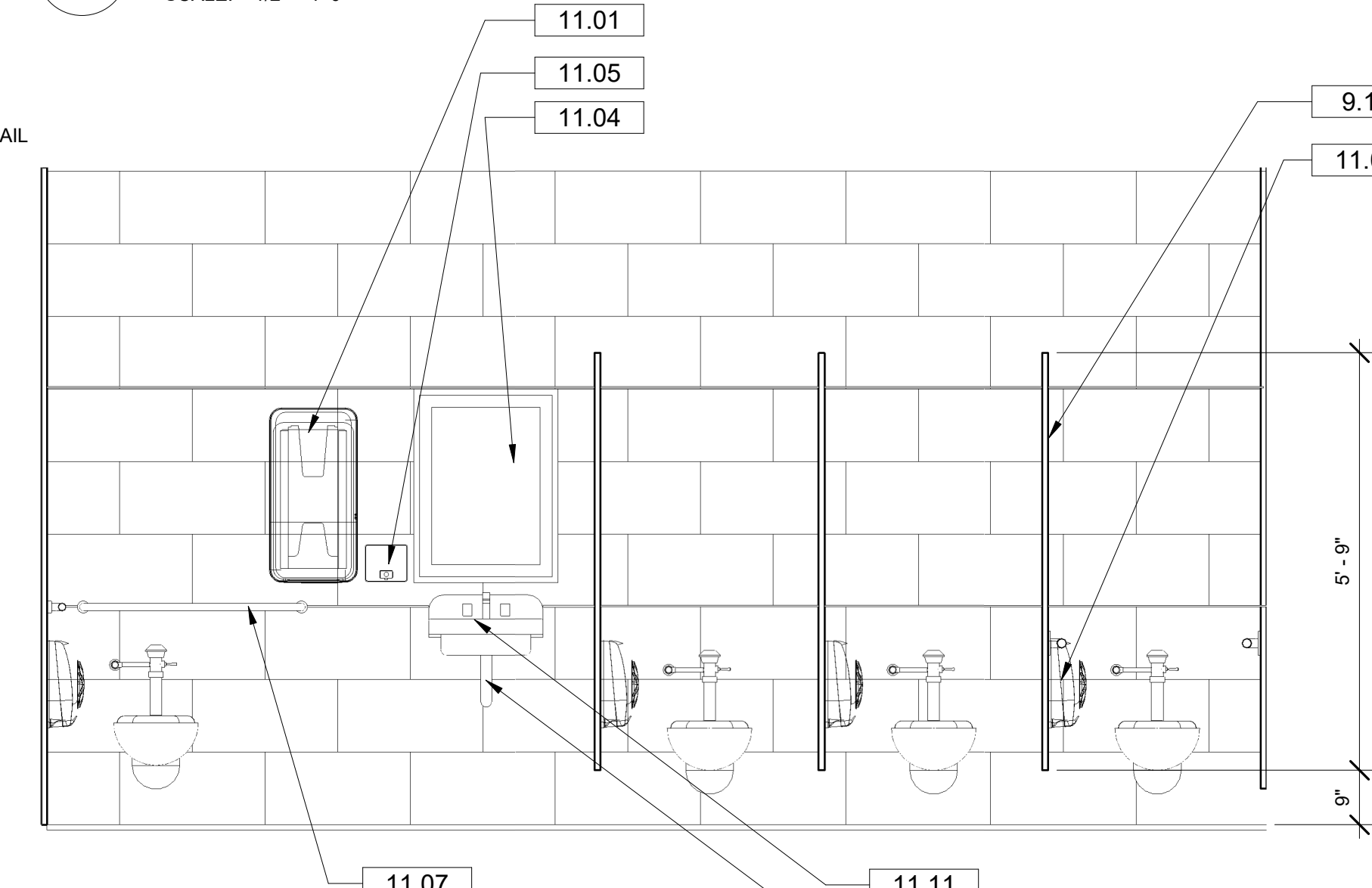
7 RESTROOM 4 - N. ELEV a
 SCALE: 1/2" = 1'-0"



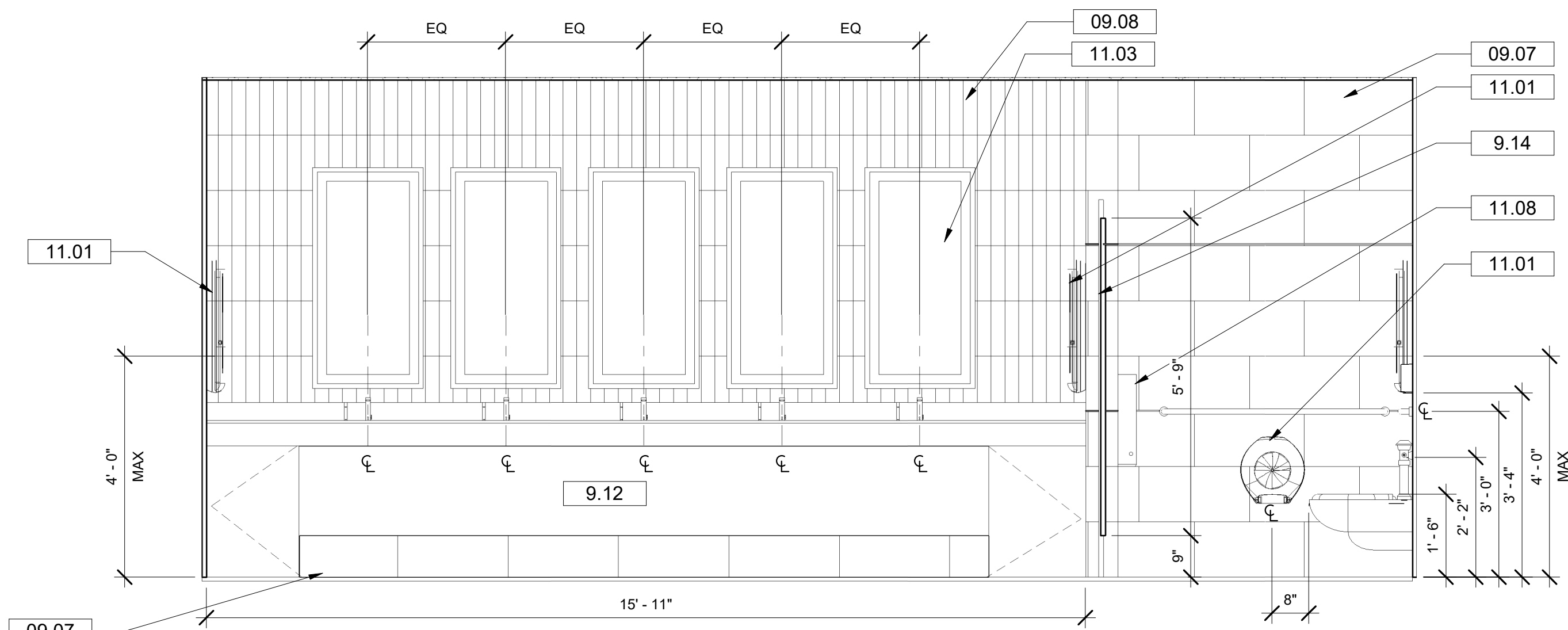
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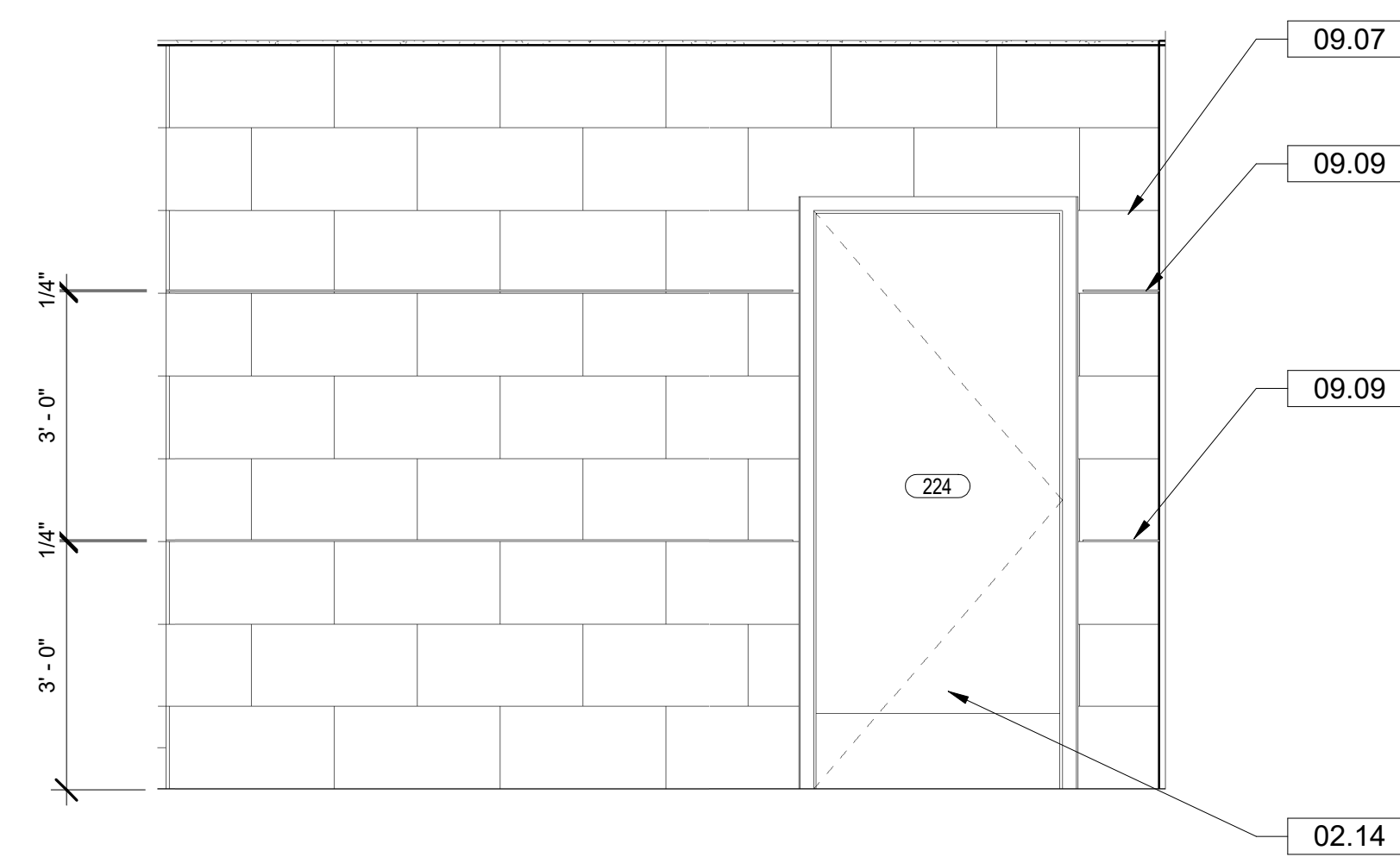
6 RESTROOM 4 - S. ELEV a
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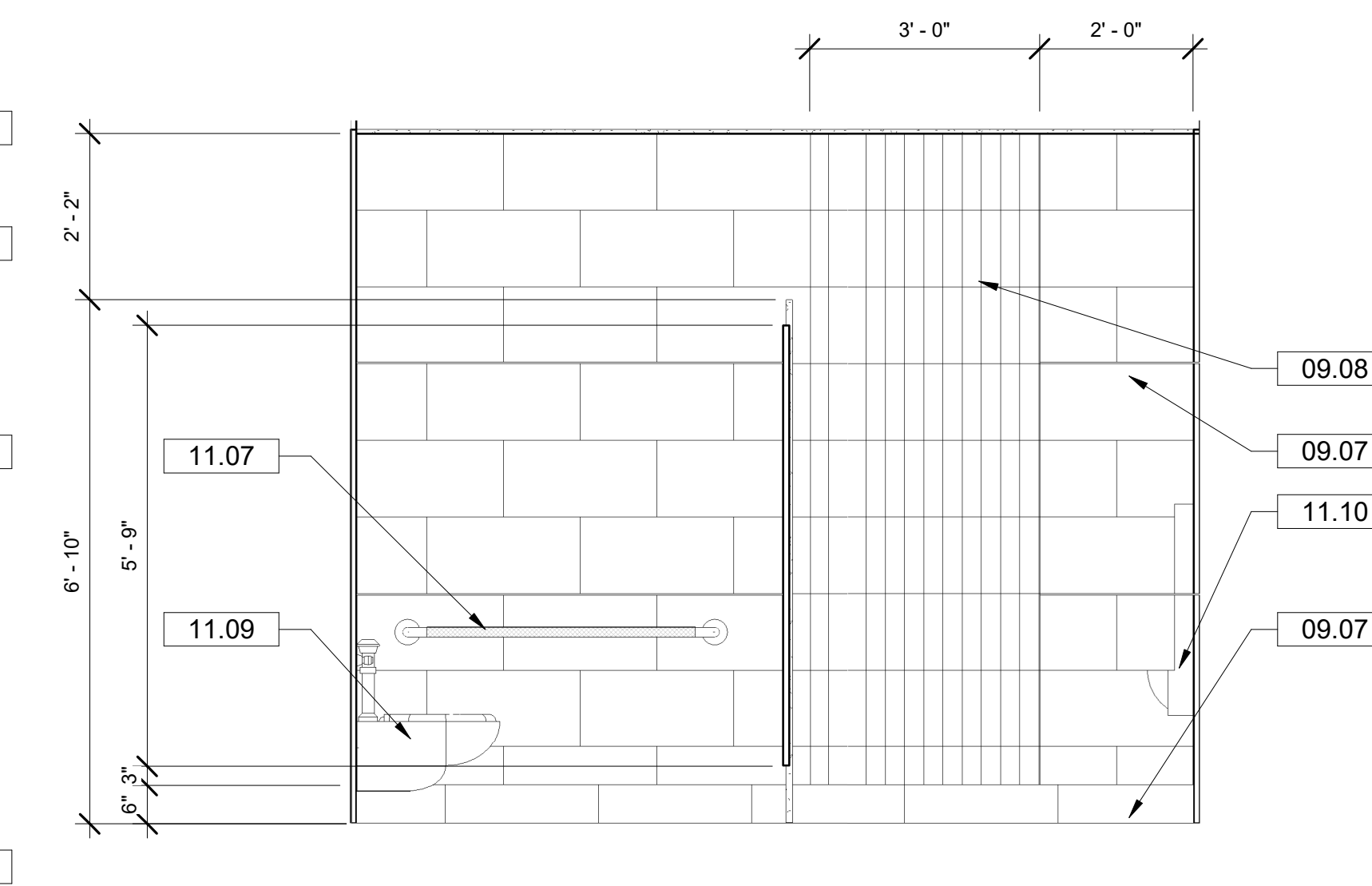
9 RESTROOM 4 - S. ELEV b
 SCALE: 1/2" = 1'-0"



5 RESTROOM 4 - E. ELEV
 SCALE: 1/2" = 1'-0"



4 RESTROOM 4 - W. ELEV a
 SCALE: 1/2" = 1'-0"



8 RESTROOM 4 - W. ELEV b
 SCALE: 1/2" = 1'-0"

GEN. NOTES: ENLG. PLAN

1. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO PERFORMING NEW WORK.
2. THE CONTRACTOR SHALL PROVIDE BLOCKING OR BRACING AS REQUIRED FOR WALL-MOUNTED AND CEILING MOUNTED EQUIPMENT.
3. CONTRACTOR SHALL COORDINATE WORK WITH MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS.
4. REFER TO FINISH LEGEND ON SHEET A400 FOR MORE INFORMATION ABOUT FINISHES SHOWN ON THIS SHEET.
5. PROVIDE POSITIVE SLOPE TOWARDS ALL FLOOR DRAINS.
6. STALL DOORS SHOWN IN ENLARGED FLOOR PLANS AS A-H FOR PARTITION HARDWARE COORDINATION ONLY. NOT RELEVANT TO DOOR SCHEDULE.
7. AUTOMATIC SOAP DISPENSER AND FAUCET SPECIFIED BY PLUMBING ENGINEER.

GENERAL NOTES: RCP

1. SEE SHEET A400 FOR ROOM FINISH SCHEDULE FOR ADDITIONAL INFORMATION.
2. ALL ACCESS PANEL LOCATIONS TO BE COORDINATED WITH MECHANICAL, ELECTRICAL, PLUMBING AND FIRE SPRINKLER WORK.
3. REPLACE CEILING AT NEW HEIGHT IN RESTROOMS #1 TO #6.
4. SEE ELECTRICAL FOR LIGHTING FIXTURE SCHEDULE.
5. WHERE APPLICABLE, ALL FIRE SPRINKLER HEADS AND ELECTRICAL FIXTURES SHALL BE CENTERED WITHIN CEILING TILES.
6. IF ANY ITEMS INDICATED ON THE DRAWINGS ARE IN CONFLICT WITH ONE ANOTHER, CONTRACTOR IS RESPONSIBLE FOR BRINGING TO ARCHITECT FOR FURTHER CLARIFICATION ON DESIGN INTENT.

KEYNOTES

NUMBER	DESCRIPTION
02.14	REMOVE, REFINISH AND REPLACE EXISTING DOOR. PROTECT EXISTING FRAME, REFINISH AND PAINT DOORS AND FRAMES - SW7019 GAULET GRAY.
02.15	REMOVE EXISTING DOOR AND FRAME, REFINISH OPENING WITH GYP. BOARD AND PAINT.
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09.07	PT-1 PORCELAIN TILE: PORCELANOSA AVENUE GREY, 12X24, FINISH NATURAL
09.08	GT-1 GLASS TILE: BODESI GLASS TILE, 4X12 COLOR PEACOCK
09.09	GT-2 GLASS PENCIL LINER: ELIDA CERAMICA 12X0.51, GLOSSY (OR SIMILAR)
9.12	SS-3 SOLID SURFACE SINK SYSTEM WITH 3 STATION TROUGH, 2 INDIVIDUAL TROUGHS, AND 2 TRASH RECEPTACLE CUTOUTS. MATERIAL: PORCELANOSA KRION SOLID SURFACE ROYAL+ SERIES ELEGANT WHITE 9105-G7. MANUFACTURER AND INSTALL BY KRION
9.14	SS-2 SOLID SURFACE: PORCELANOSA KRION CARRARA DARK L105-G9. HARDWARE BY KRION MANUFACTURER PROVIDED
10.04	PROVIDE STANDARD PIPE WRAP AT LAV. FOR ANY EXPOSED INSTANCES. SEE PLUMBING FOR SPECIFICATION.
11.01	TORK HAND TOWEL DISPENSER, S52520, WHITE, OWNER PROVIDED, CONTRACTOR INSTALLED
11.02	TORK 3 ROLL BATH TISSUE ROLL DISPENSER, S65828, WHITE, OWNER PROVIDED, CONTRACTOR INSTALLED
11.03	MIRROR: PARIS MIRROR LIGHTED MIRROR HARMONY: 24X48" LED 110V WIRING (Model # HARM243200K-24-0)
11.04	MIRROR: PARIS MIRROR LIGHTED MIRROR HARMONY: 24X32" LED 110V WIRING (Model # HARM243200K-24-0)
11.05	ADA SOAP DISPENSER, OWNER FURNISHED, CONTRACTOR INSTALLED (SEE PLUMBING SPEC)
11.07	GB: GRAB BAR (ADA HEIGHT) MOUNTED BETWEEN 33-36" AFF.
11.08	CHANGING TABLE: KOALA KARE KB200-05, WHITE GRANITE, MOUNTED 24" AFF
11.09	ADA ADULT TOILET (WALL MOUNTED) (SEE PLUMBING SPECS)
11.10	ADA ADULT URINAL (WALL-MOUNTED) (SEE PLUMBING SPECS)
11.11	ADA LAVATORY SPECIFIED BY PLUMBING ENGINEER

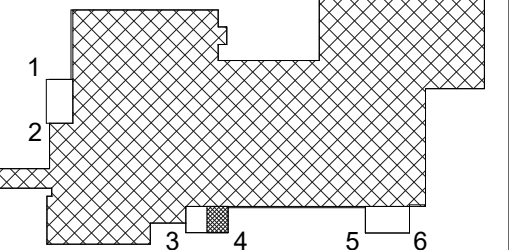


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 HVAC UPGRADES & RESTROOM RENOVATIONS
 TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
 1250 MIRACLE STRIP PKWY SE
 FORT WALTON BEACH, FL 32548



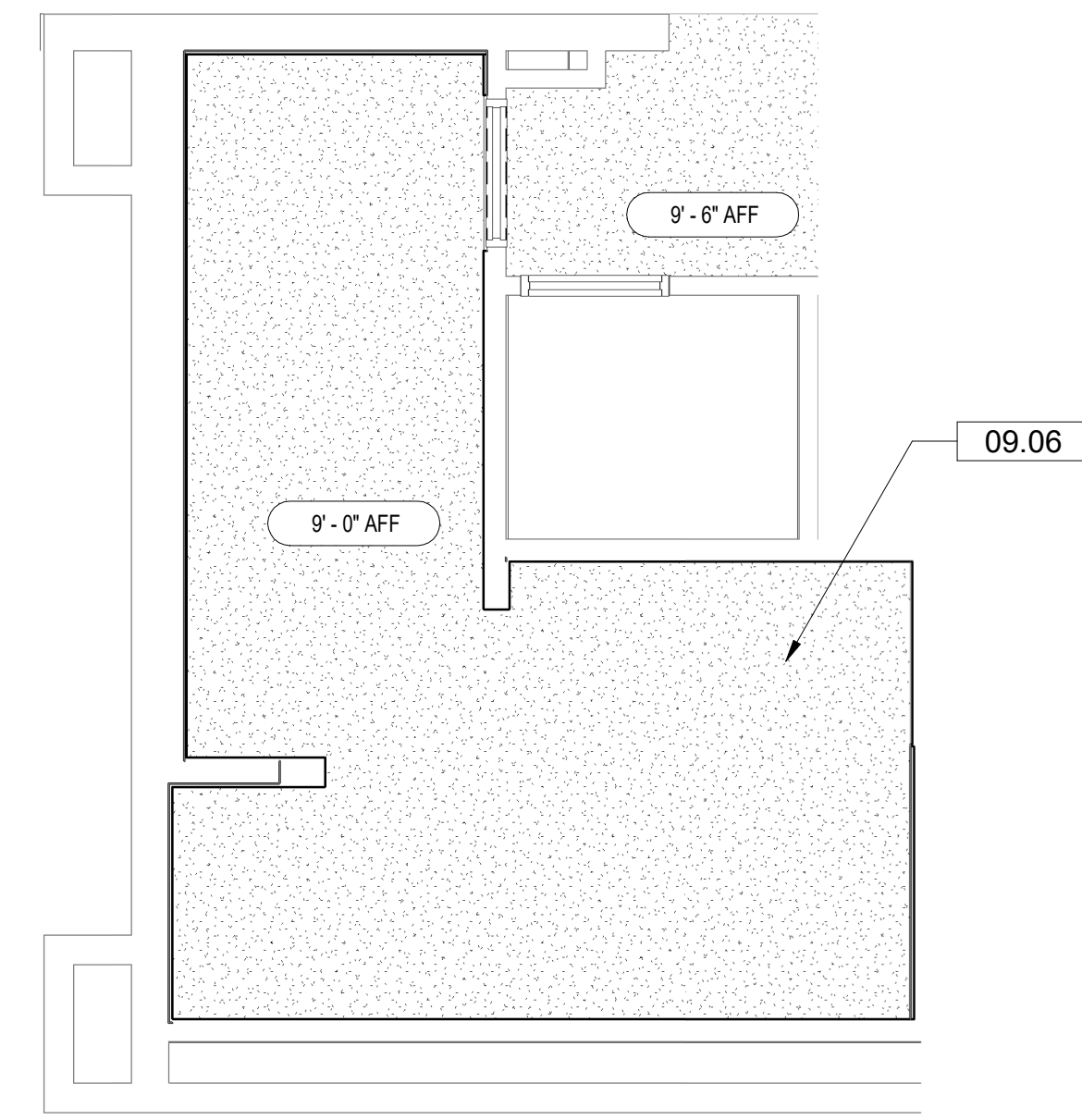
REVISIONS:

No.	Description	Date

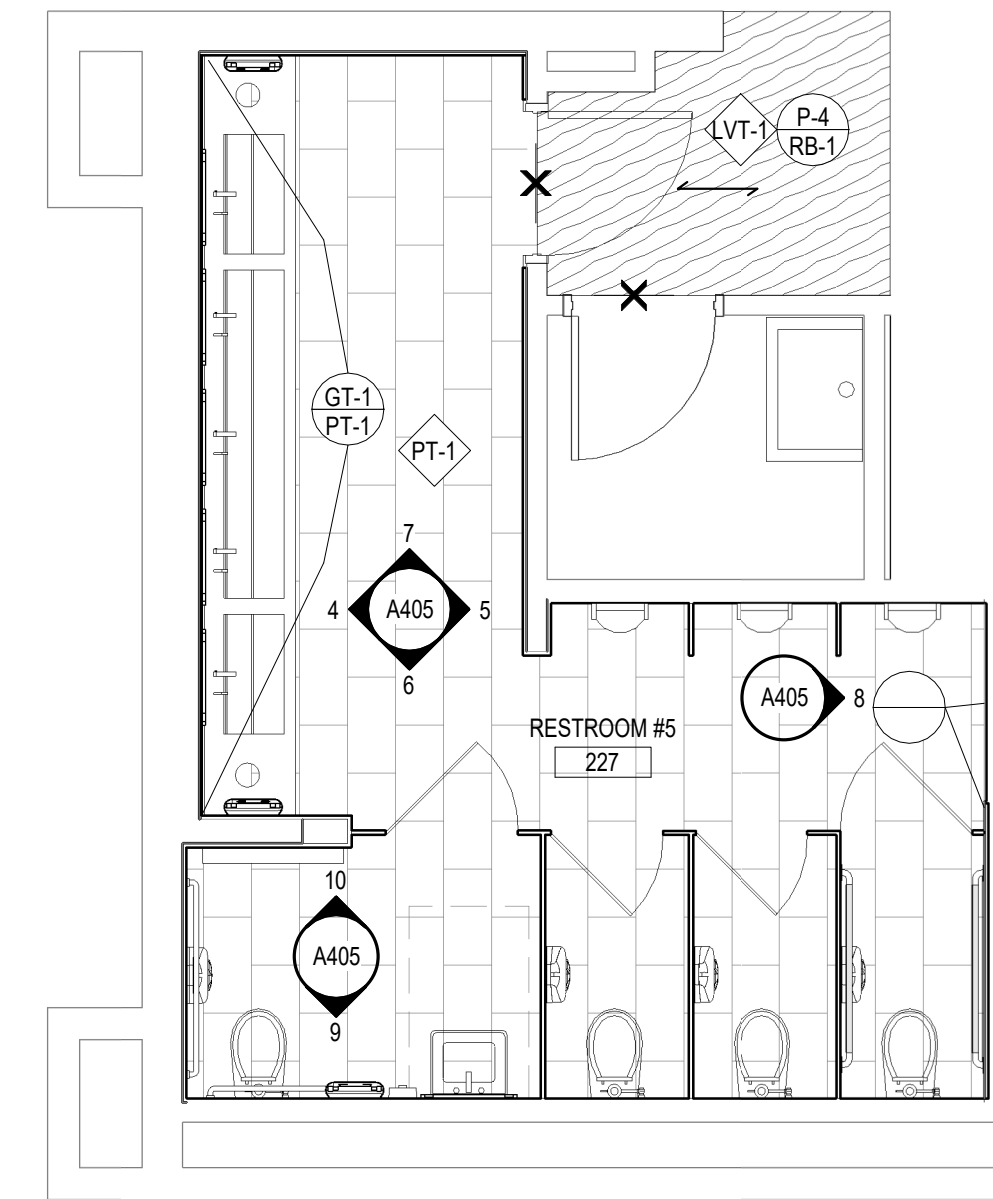
ENLARGED PLAN - RESTROOM 4

Project number 17057.8
 Dated 04-12-21
 PIC Approver
 PM SLN

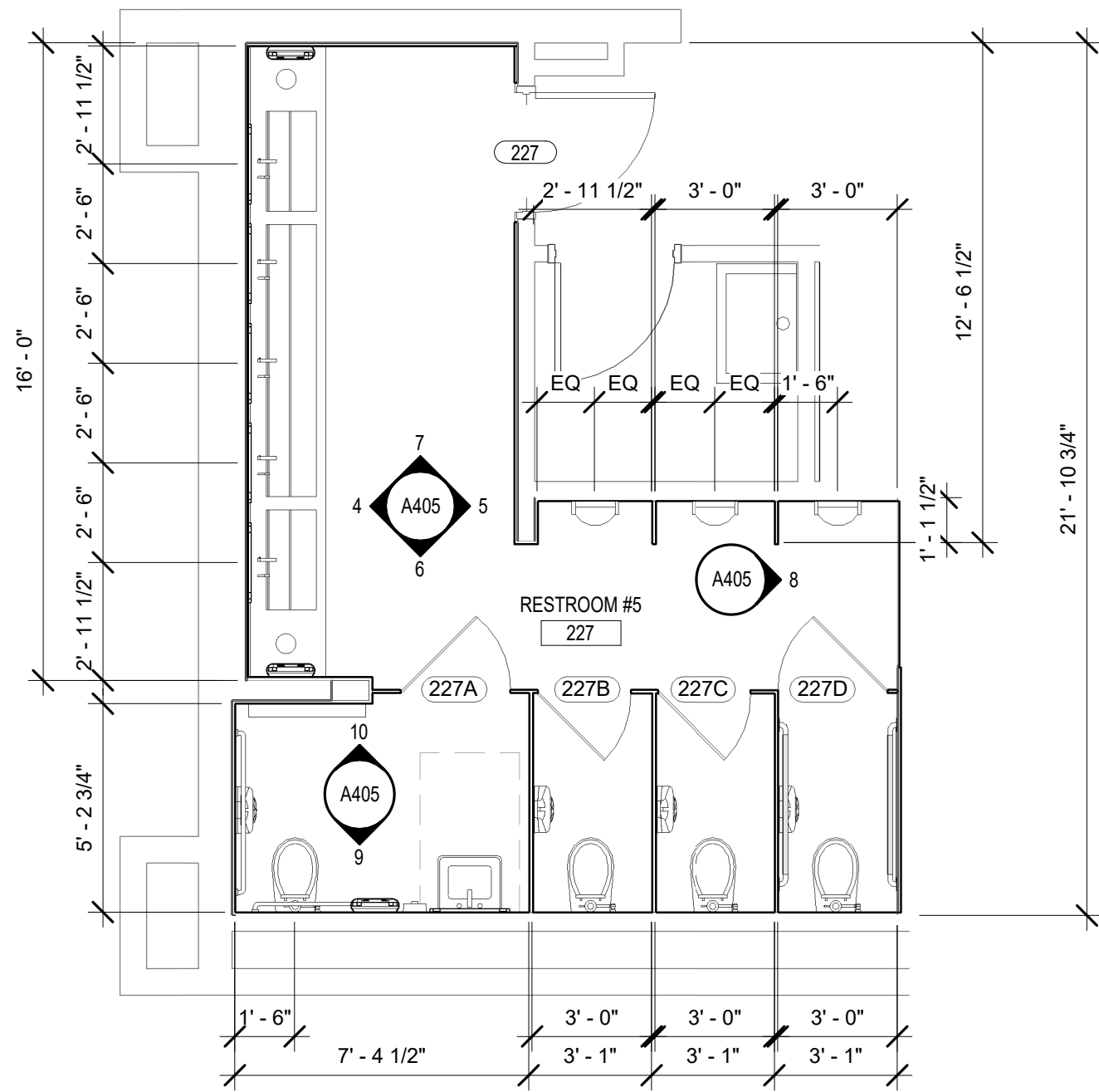
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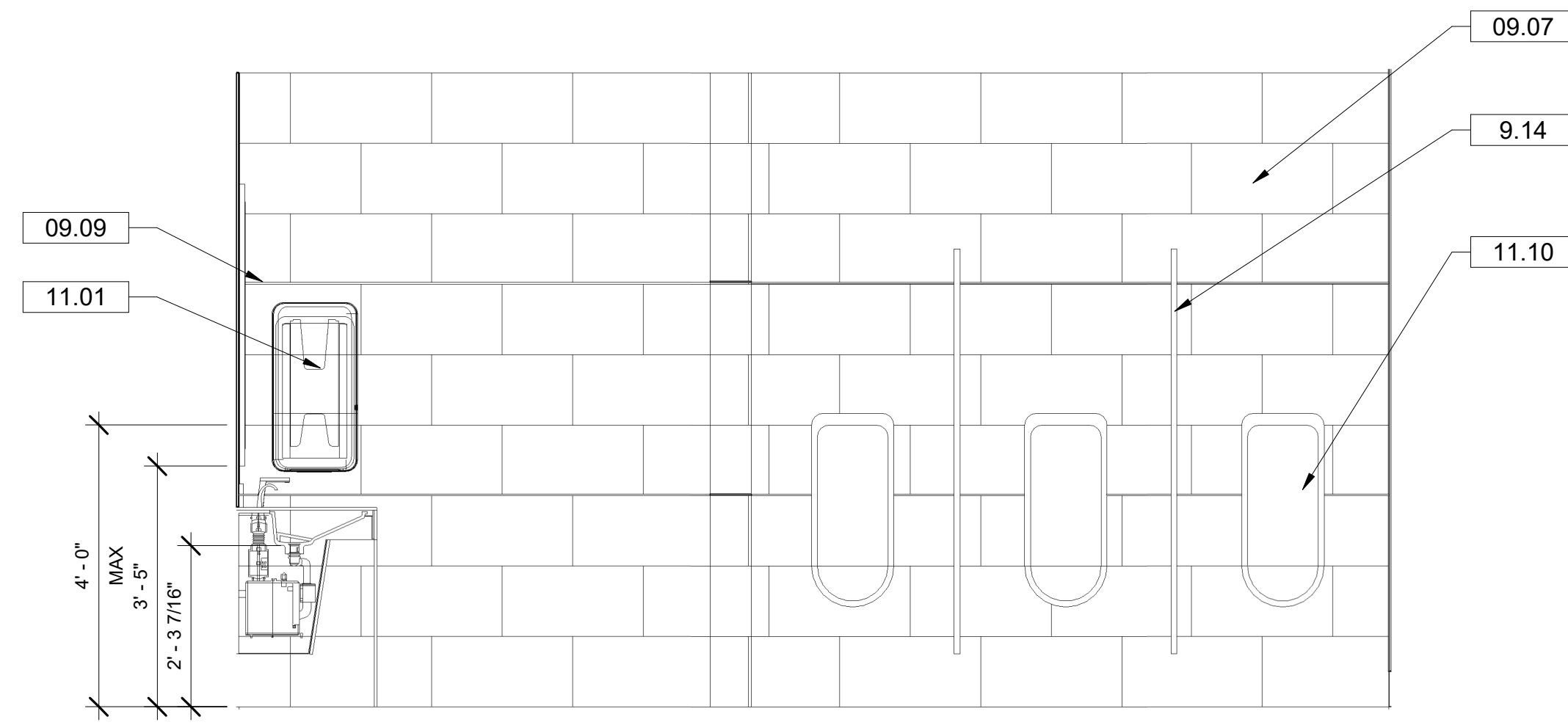
3 RCP - RESTROOM 5
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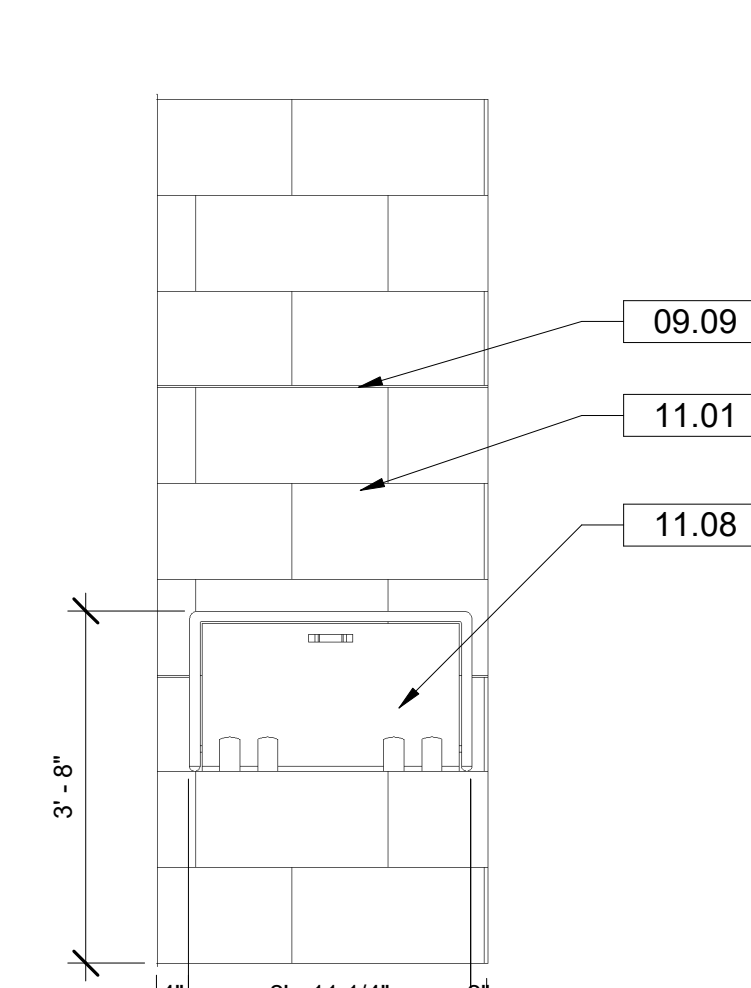
2 FINISH PLAN - RESTROOM 5
 SCALE: 1/4" = 1'-0"



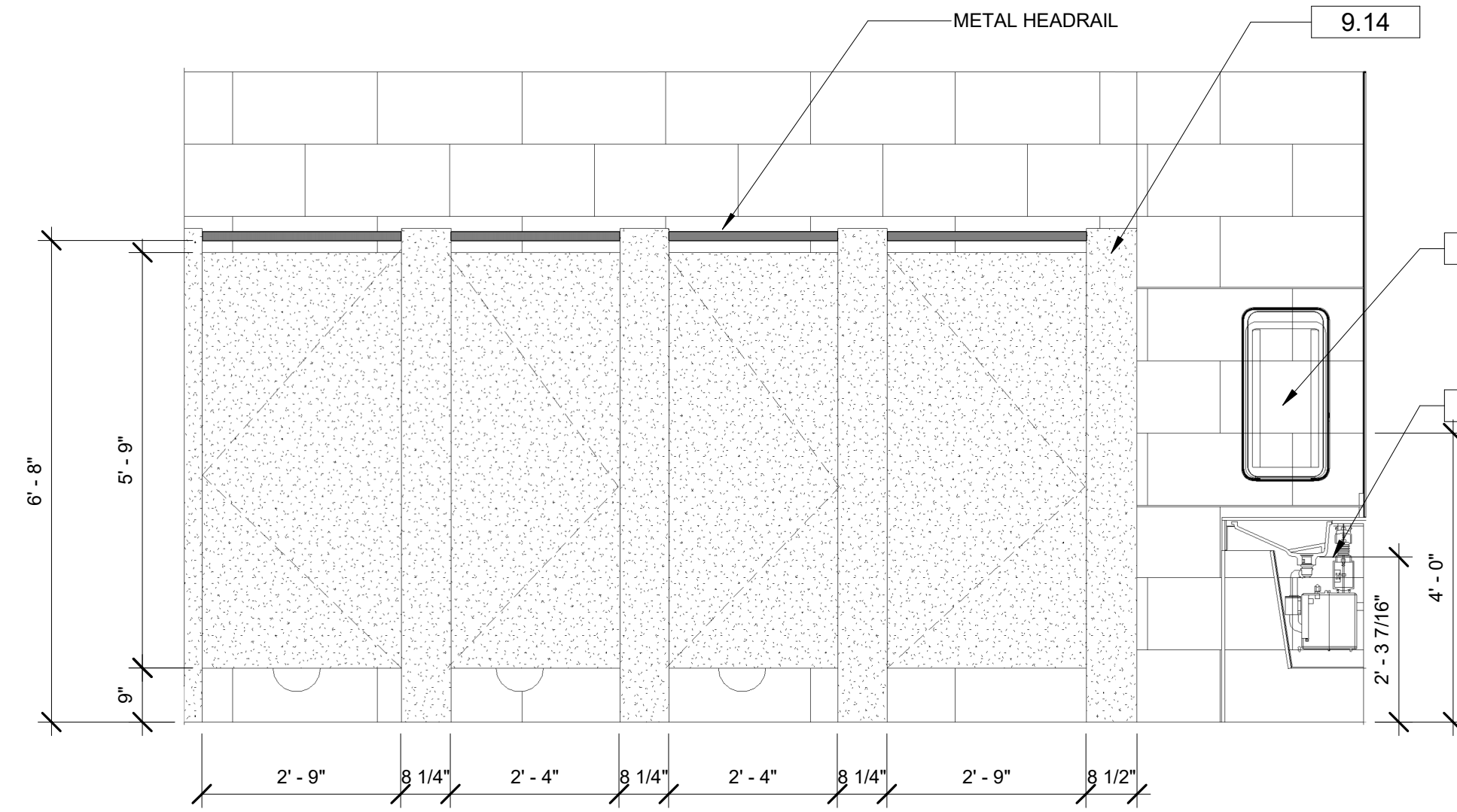
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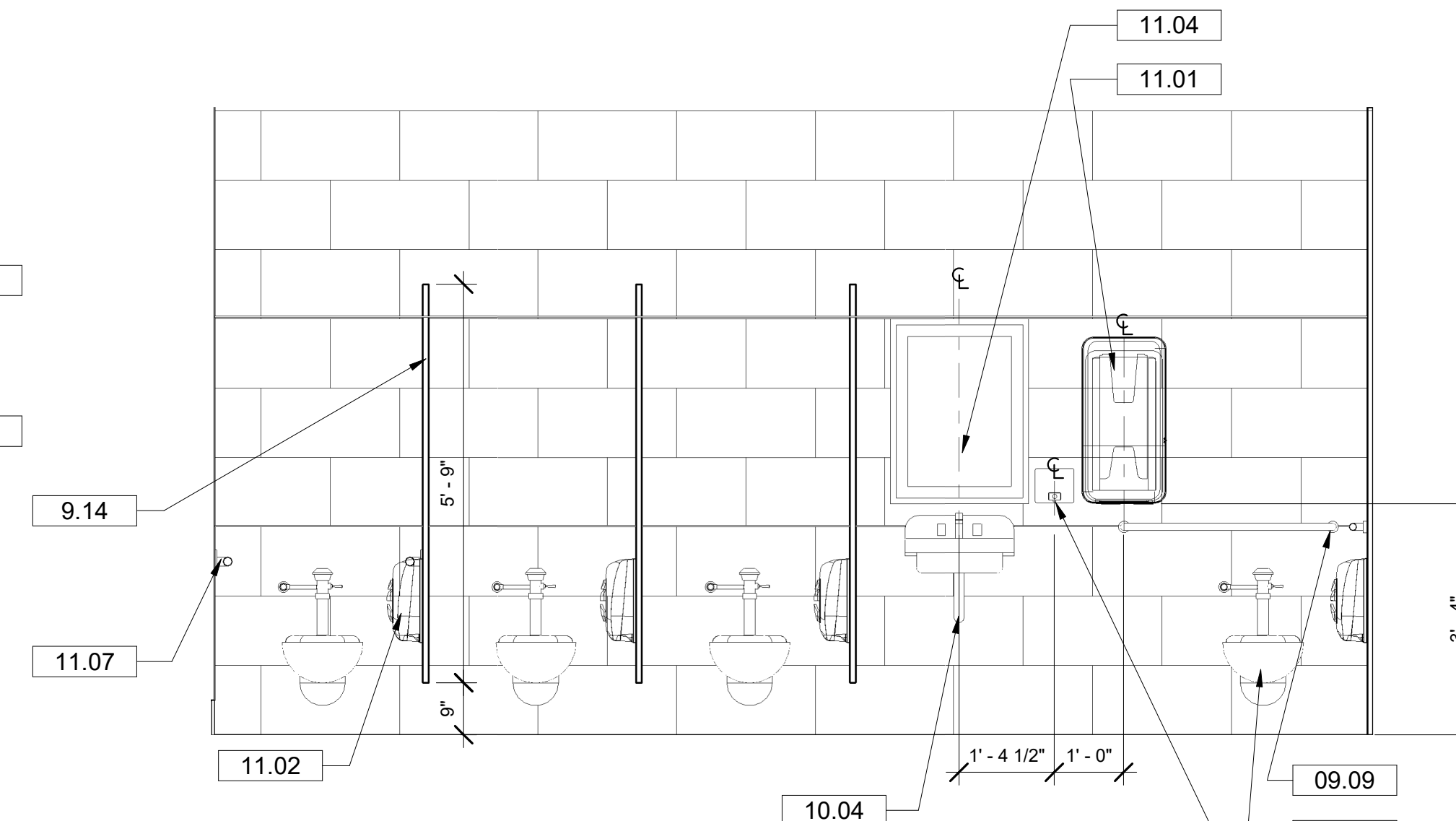
7 RESTROOM 5 - N. ELEV. a
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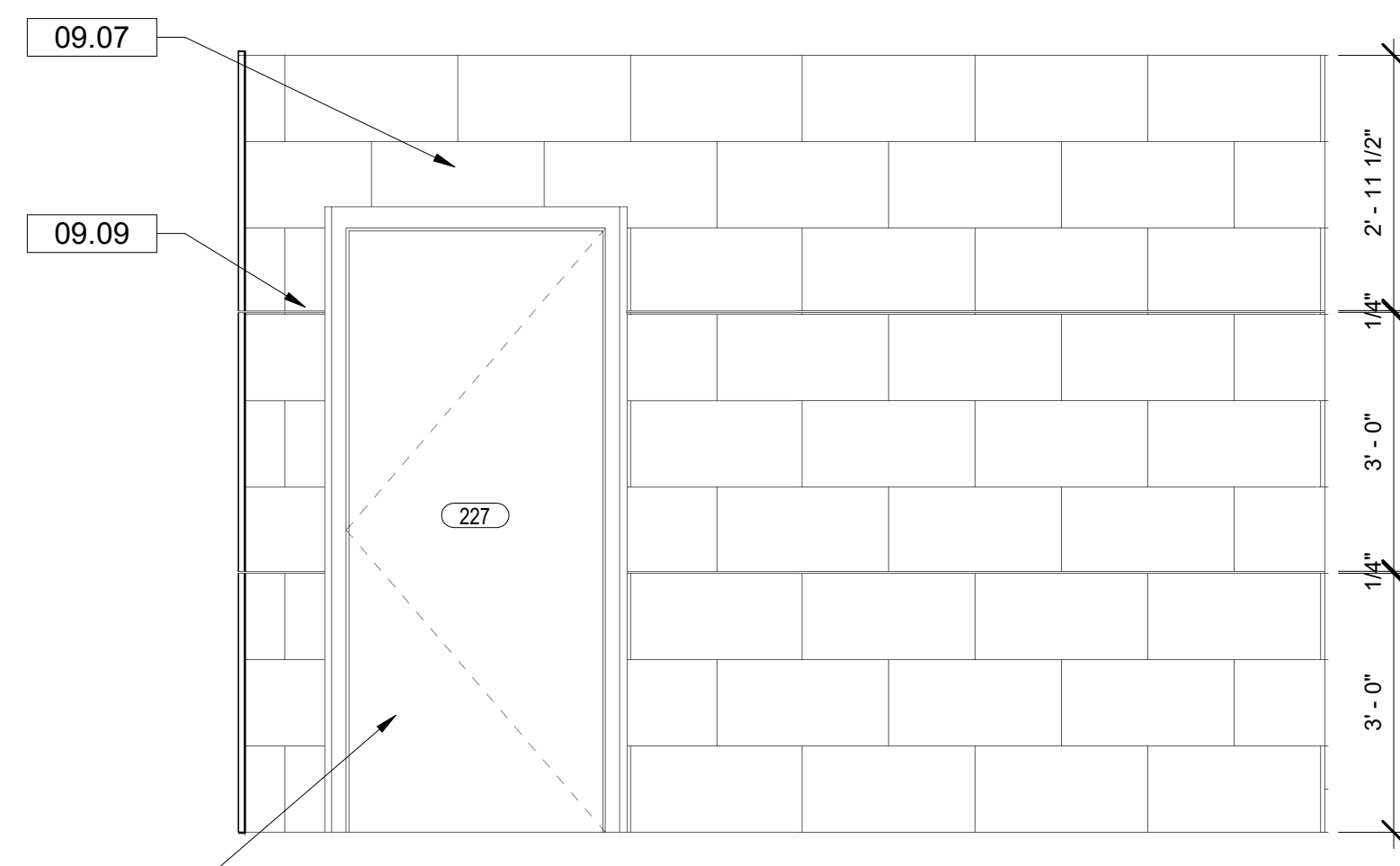
10 RESTROOM 5 - N. ELEV. b
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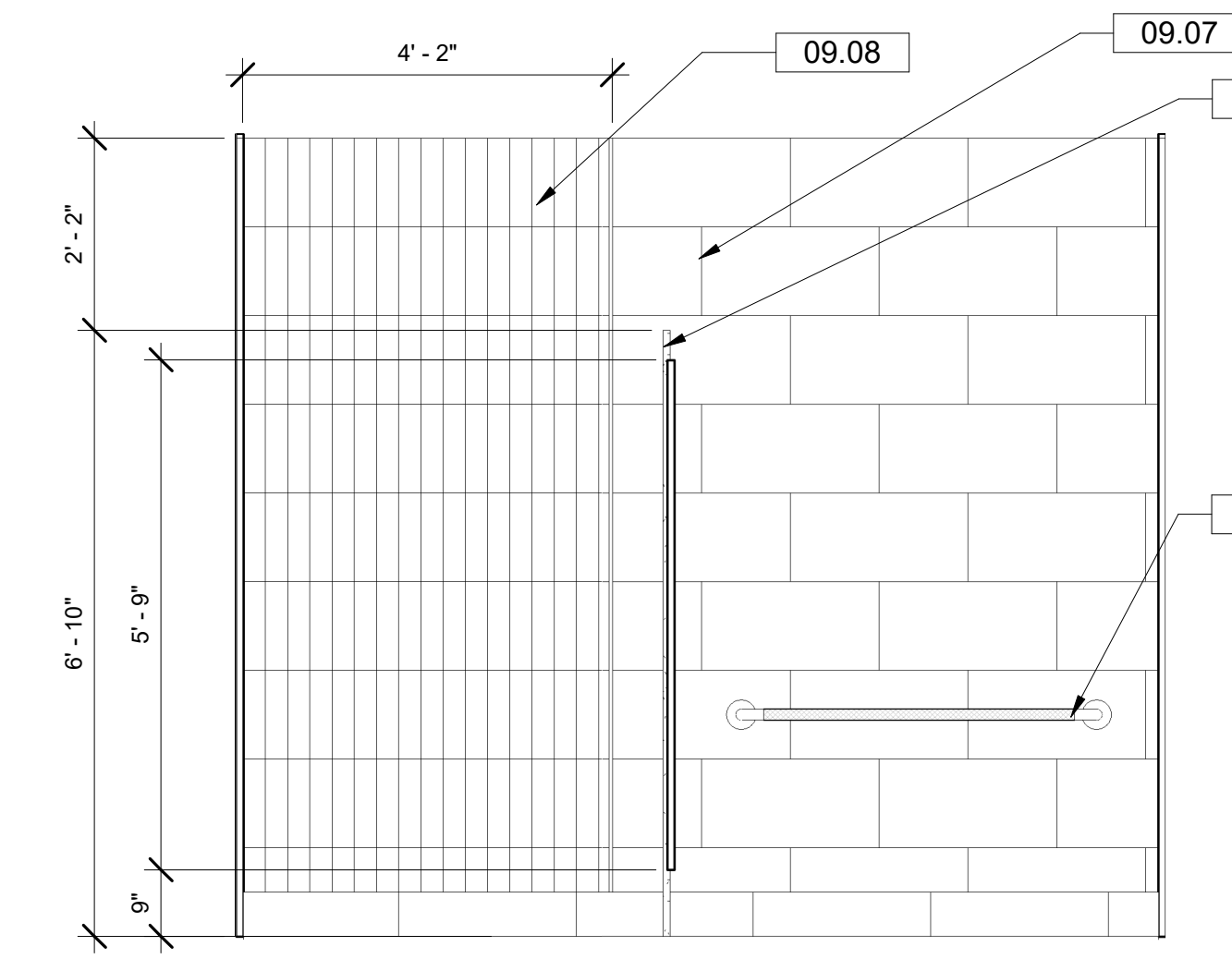
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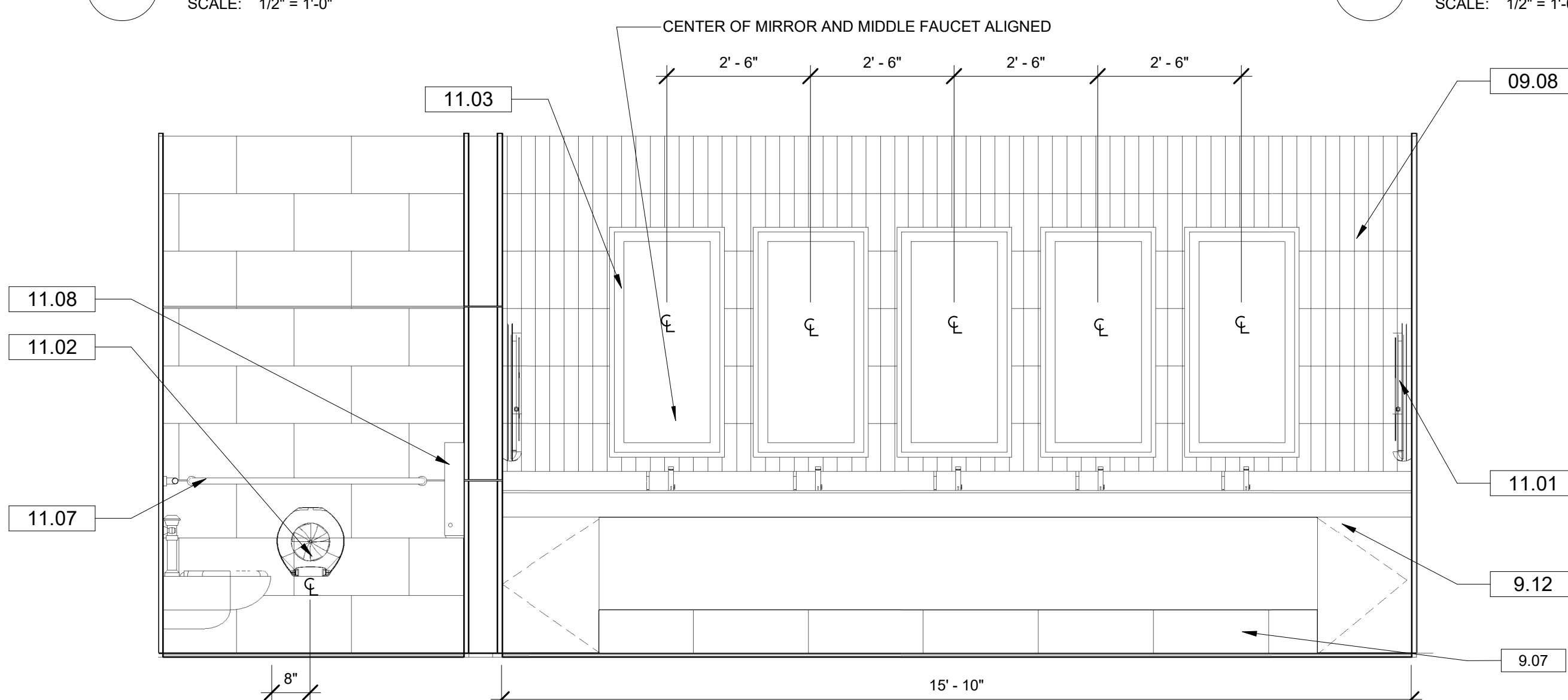
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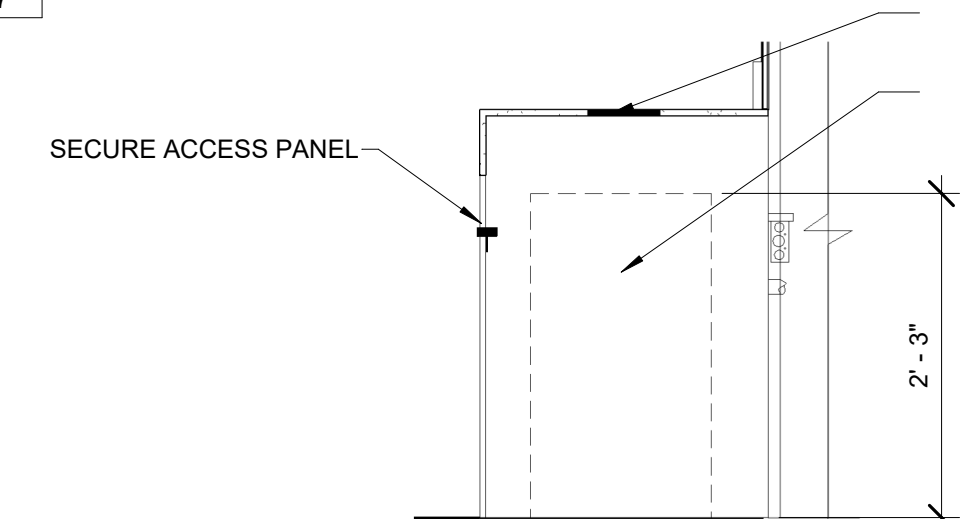
5 RESTROOM 5 - E. ELEV. a
 SCALE: 1/2" = 1'-0"



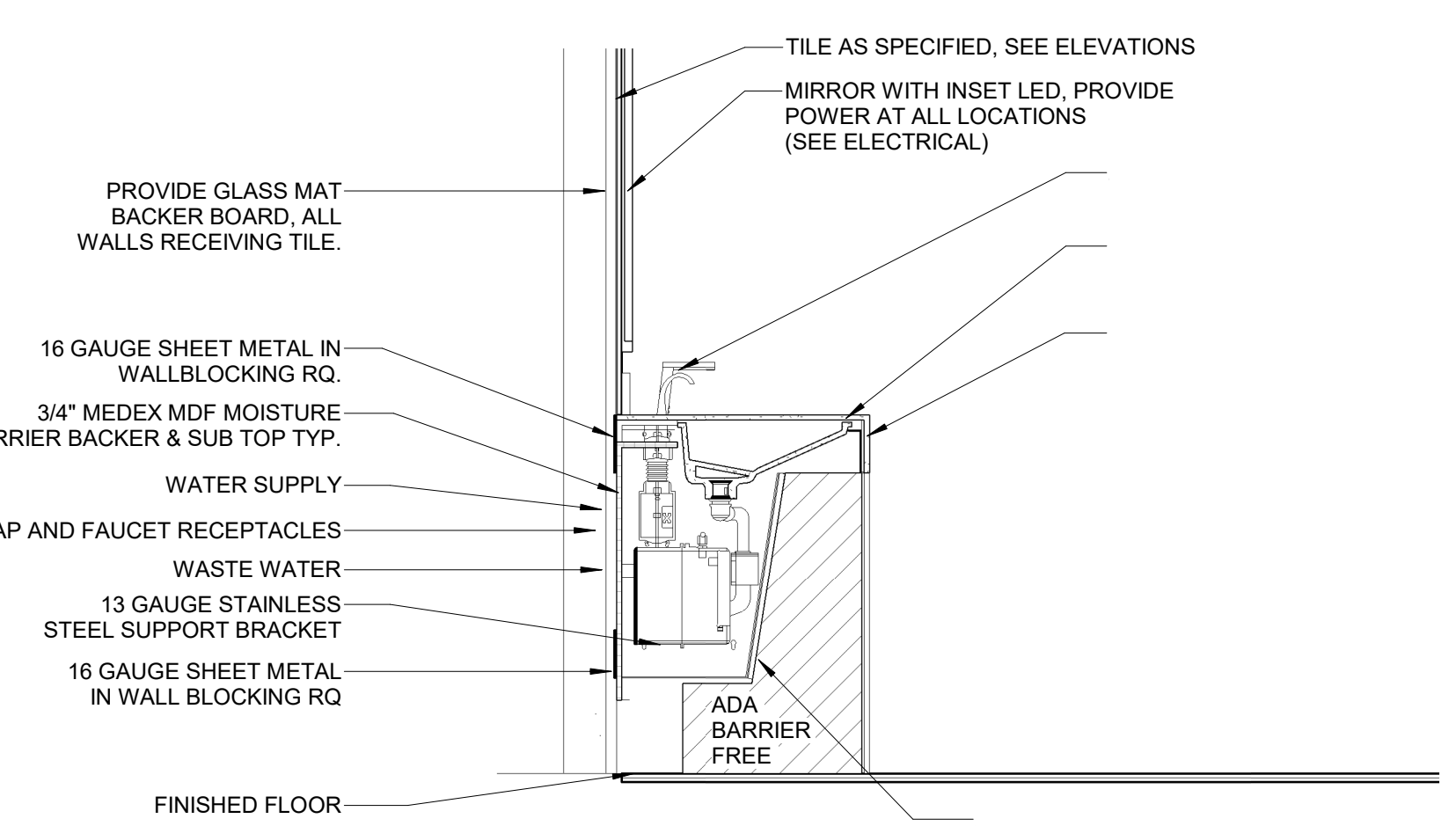
8 RESTROOM 5 - E. ELEV. b
 SCALE: 1/2" = 1'-0"



4 RESTROOM 5 - W. ELEV.
 SCALE: 1/2" = 1'-0"



12 TRASH RECEPTACLE SECTION DETAIL
 SCALE: 3/4" = 1'-0"



11 VANITY SECTION DETAIL
 SCALE: 3/4" = 1'-0"

KEYNOTES	
NUMBER	DESCRIPTION
02.14	REMOVE, REFINISH AND REPLACE EXISTING DOOR. PROTECT EXISTING FRAME. REFINISH AND PAINT DOORS AND FRAMES - SW7019 GAULTLET GRAY.
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10.04	PROVIDE STANDARD PIPE WRAP AT LAV. FOR ANY EXPOSED INSTANT. SEE PLUMBING FOR SPECIFICATION.
11.01	TORK HAND TOWEL DISPENSER, 552520, WHITE. OWNER PROVIDED. CONTRACTOR INSTALLED
11.02	TORK 3 ROLL BATH TISSUE ROLL DISPENSER, 565828, WHITE. OWNER PROVIDED. CONTRACTOR INSTALLED
11.03	MIRROR: PARIS MIRROR: LIGHTED MIRROR HARMONY: 24X48" LED 110V WIRING (Model # HARM243000K-24VD)
11.04	MIRROR: PARIS MIRROR: LIGHTED MIRROR HARMONY: 24X32" LED 110V WIRING (Model # HARM2432000K-24VD)
11.05	ADA SOAP DISPENSER, OWNER FURNISHED, CONTRACTOR INSTALLED (SEE PLUMBING SPEC)
11.07	GB: GRAB BAR (ADA HEIGHT) MOUNTED BETWEEN 33-36" AFF CHANGING TABLE: KOALA KARE KB200-05, WHITE GRANITE: MOUNTED 24" AFF
11.09	ADA ADULT TOILET (WALL MOUNTED) (SEE PLUMBING SPECS)
11.10	ADA ADULT URINAL (WALL-MOUNTED) (SEE PLUMBING SPECS)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

- WORK:
- 1.
 - 2.
 - 3.
 - 4.
 - 5.
 - 6.
- TILES:

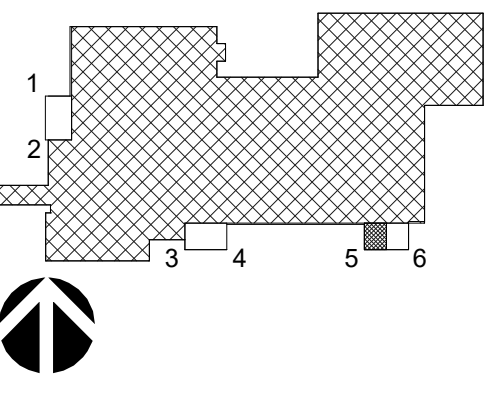


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HVAC UPGRADES & RESTROOM RENOVATIONS
 TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
 1250 MIRACLE STRIP PKWY SE
 FORT WALTON BEACH, FL 32548



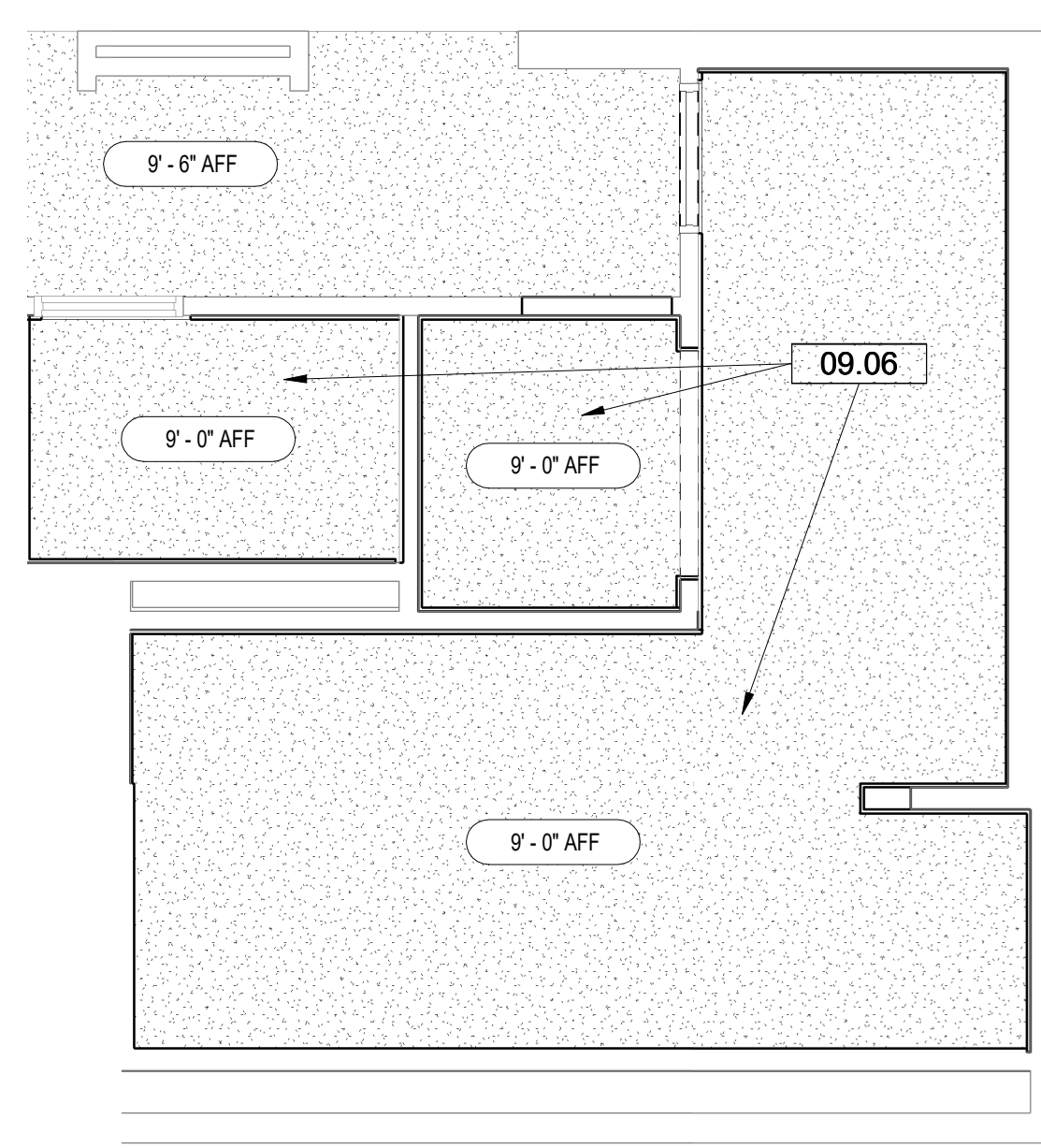
REVISIONS:

No.	Description	Date

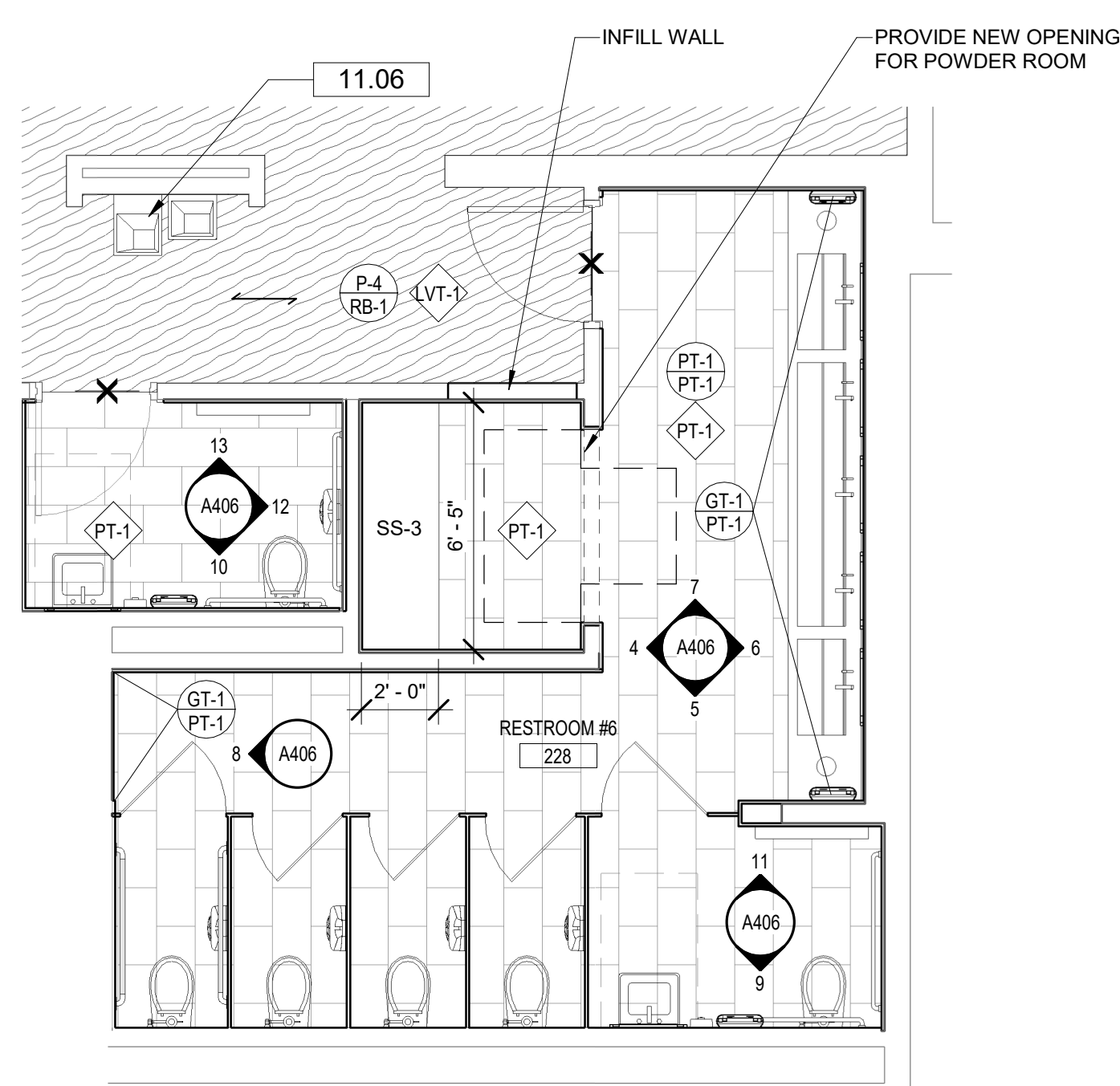
ENLARGED PLAN - RESTROOM 5

Project number	17057.8
Dated	04-12-21
PIC	Approver
PM	SLN

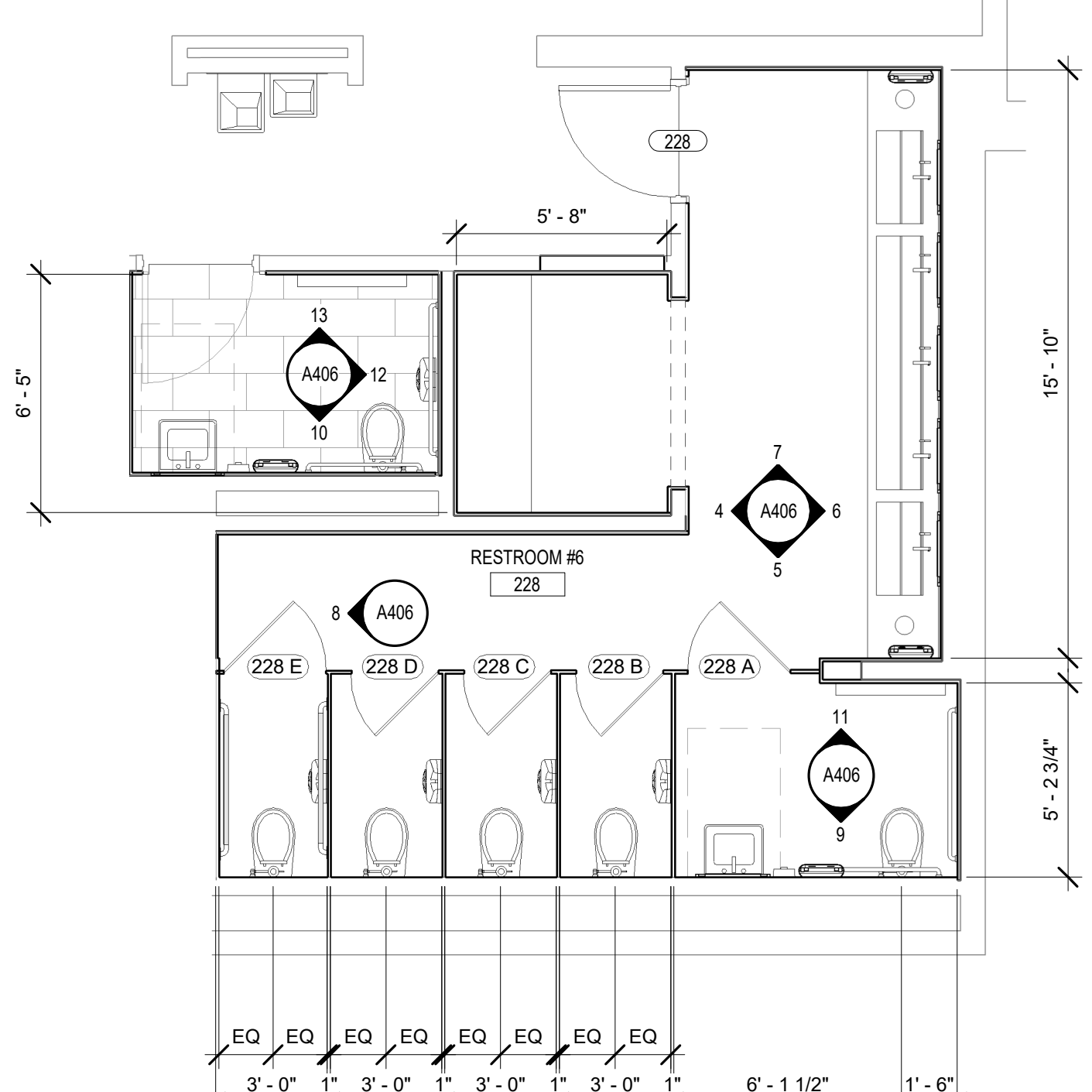
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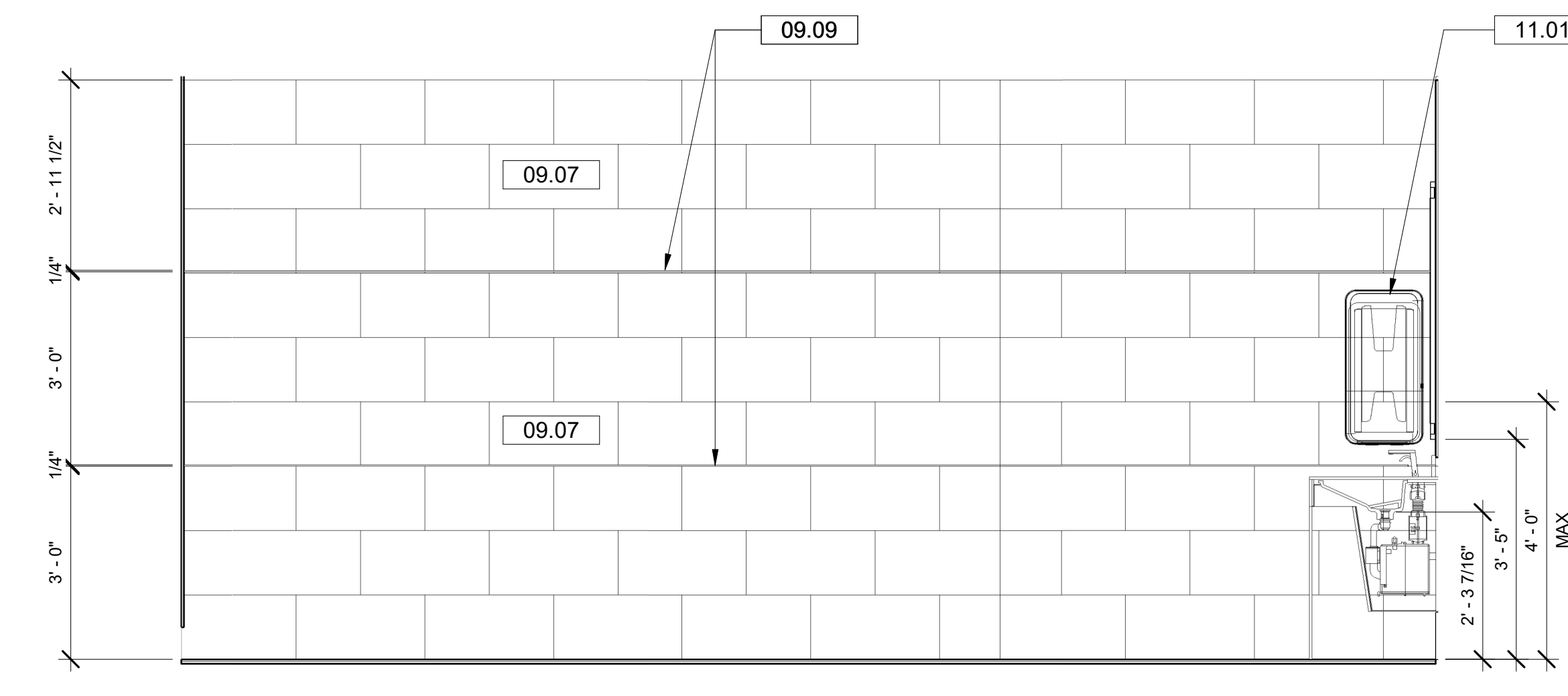
3 RCP - RESTROOM 6
SCALE: 1/4" = 1'-0"



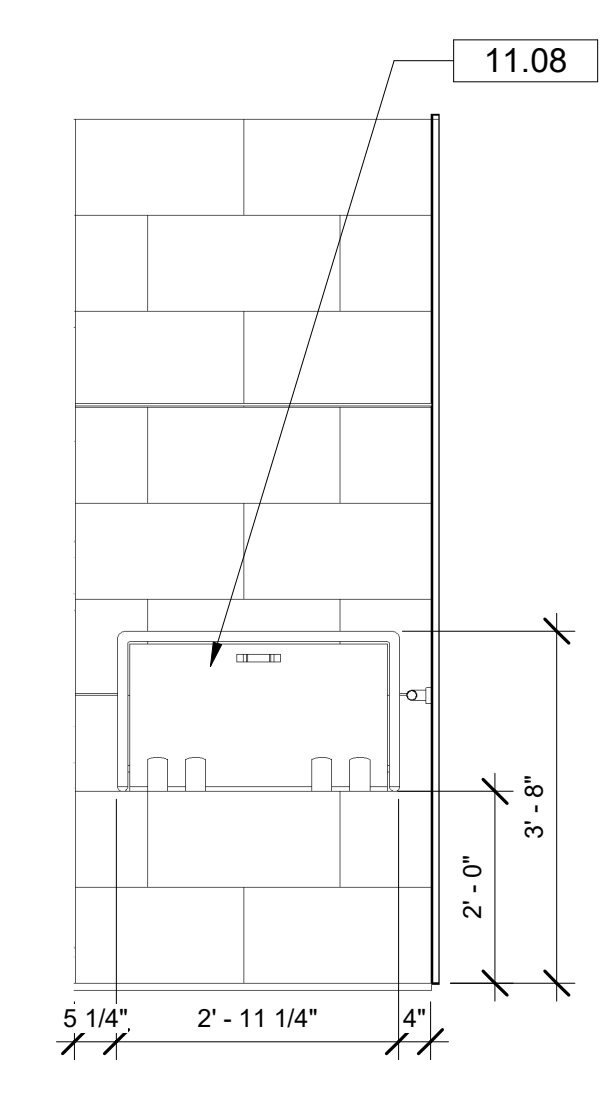
2 FINISH PLAN - RESTROOM 6
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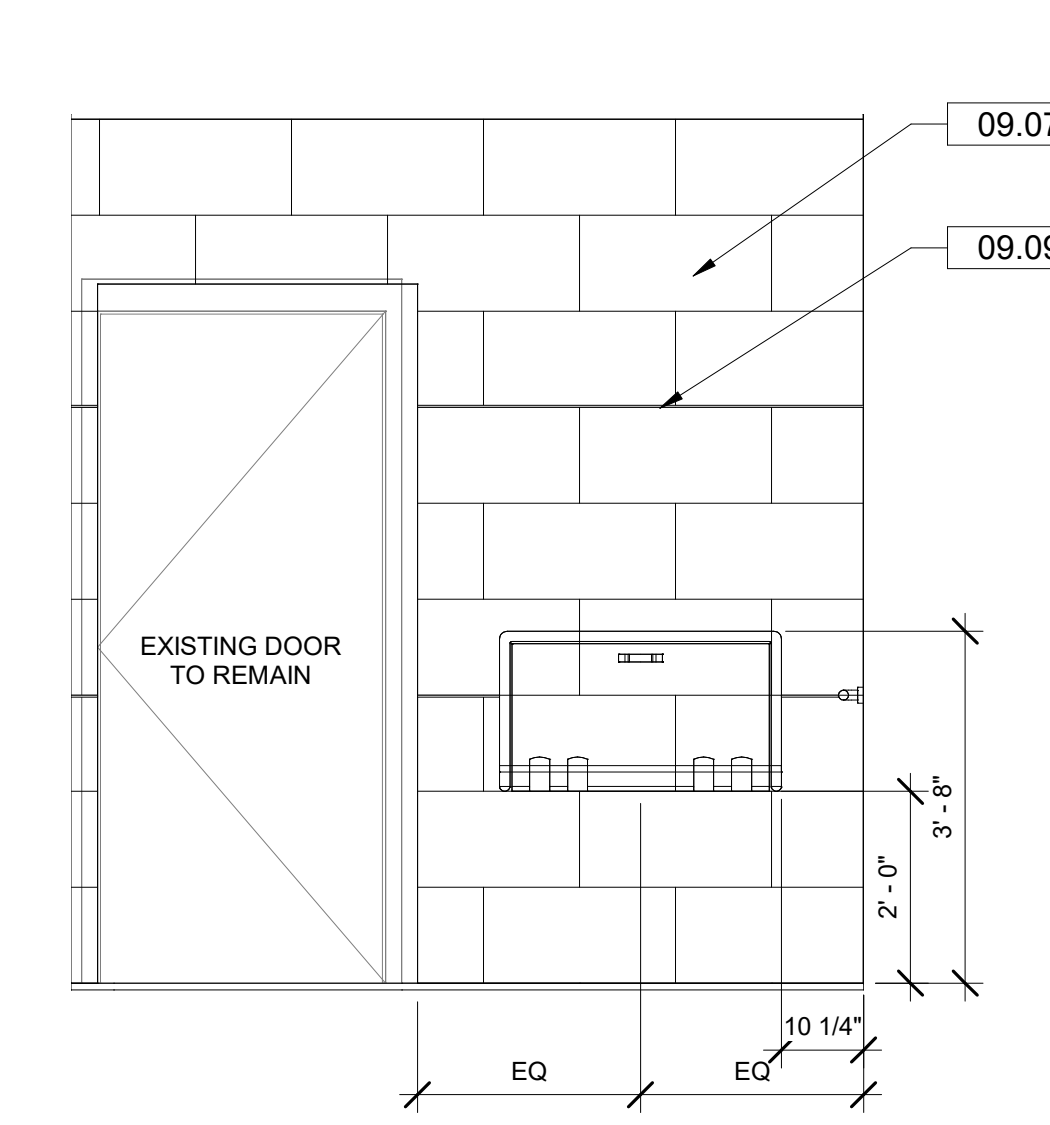
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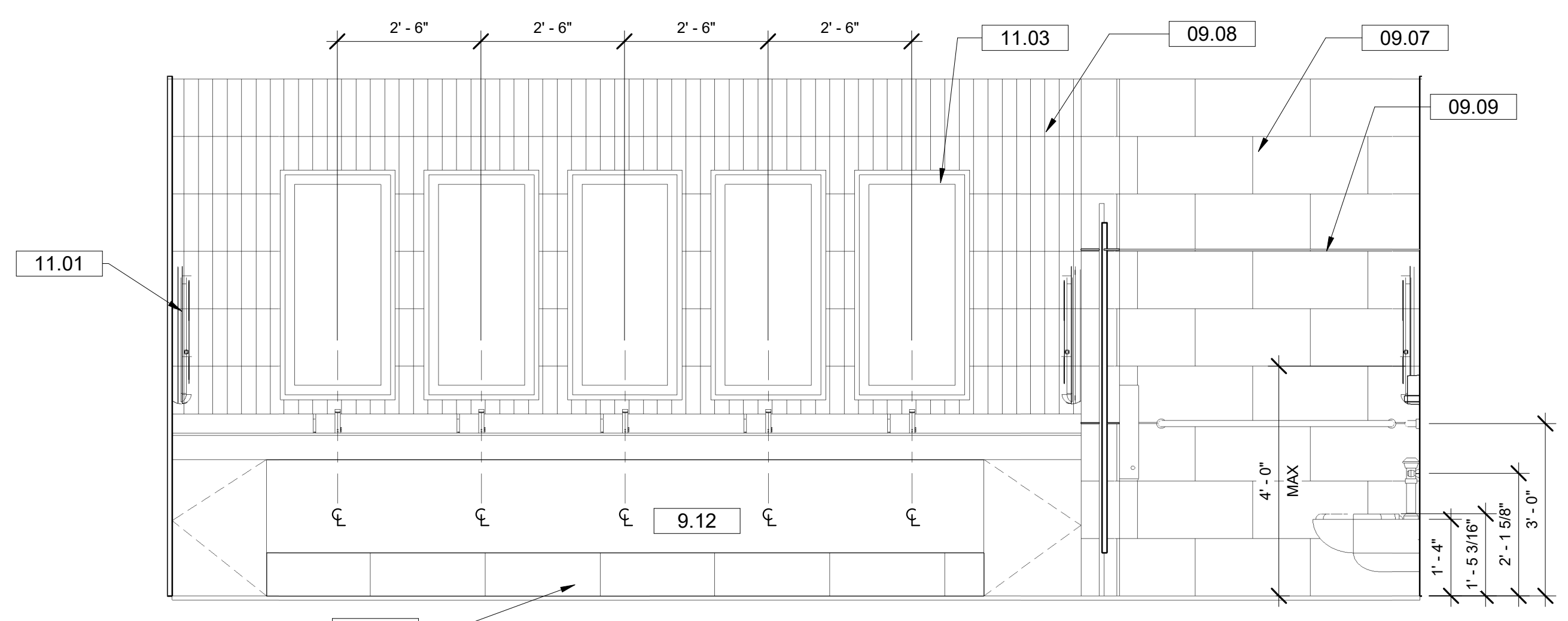
7 RESTROOM 6 - N. ELEV a
SCALE: 1/2" = 1'-0"



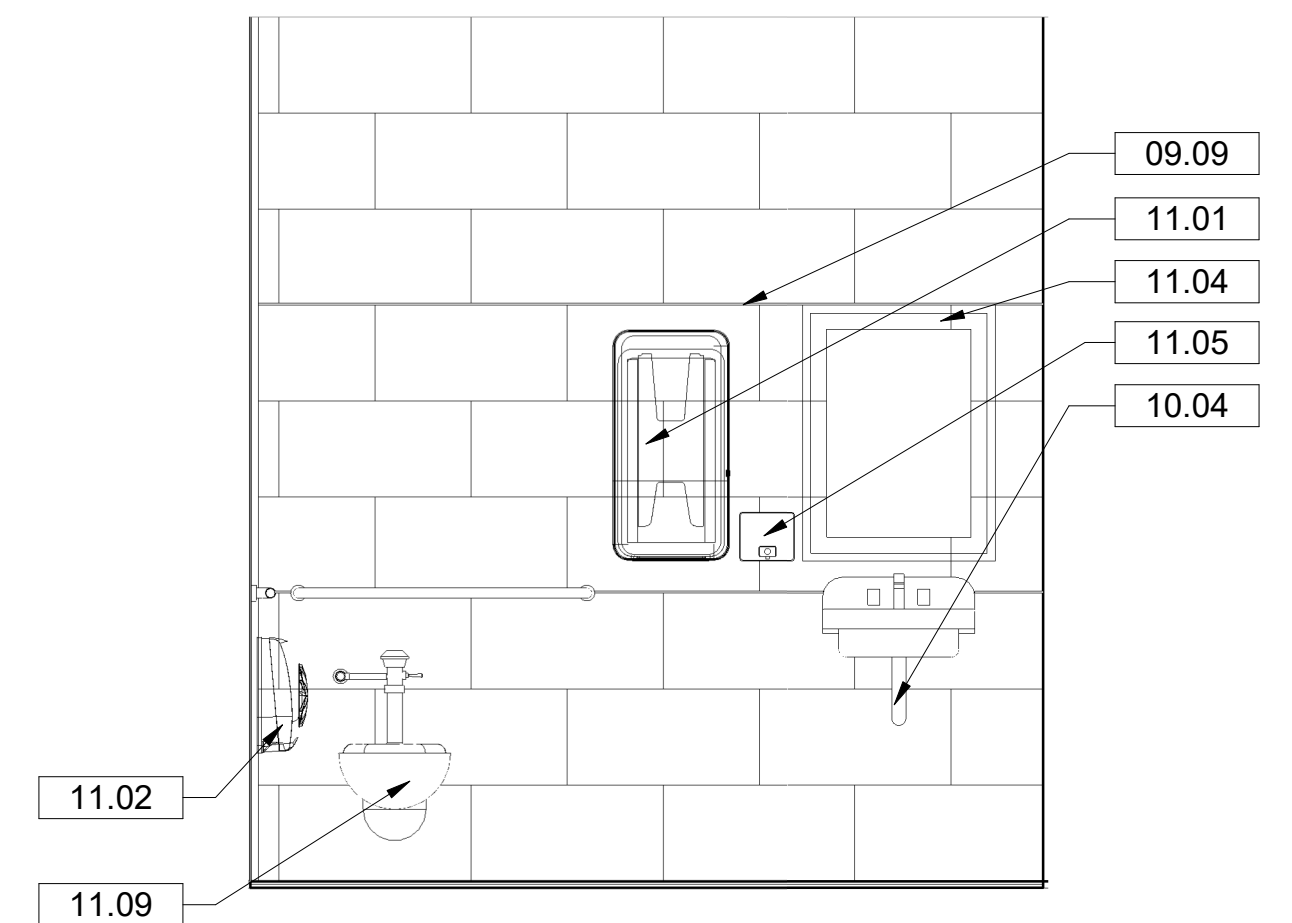
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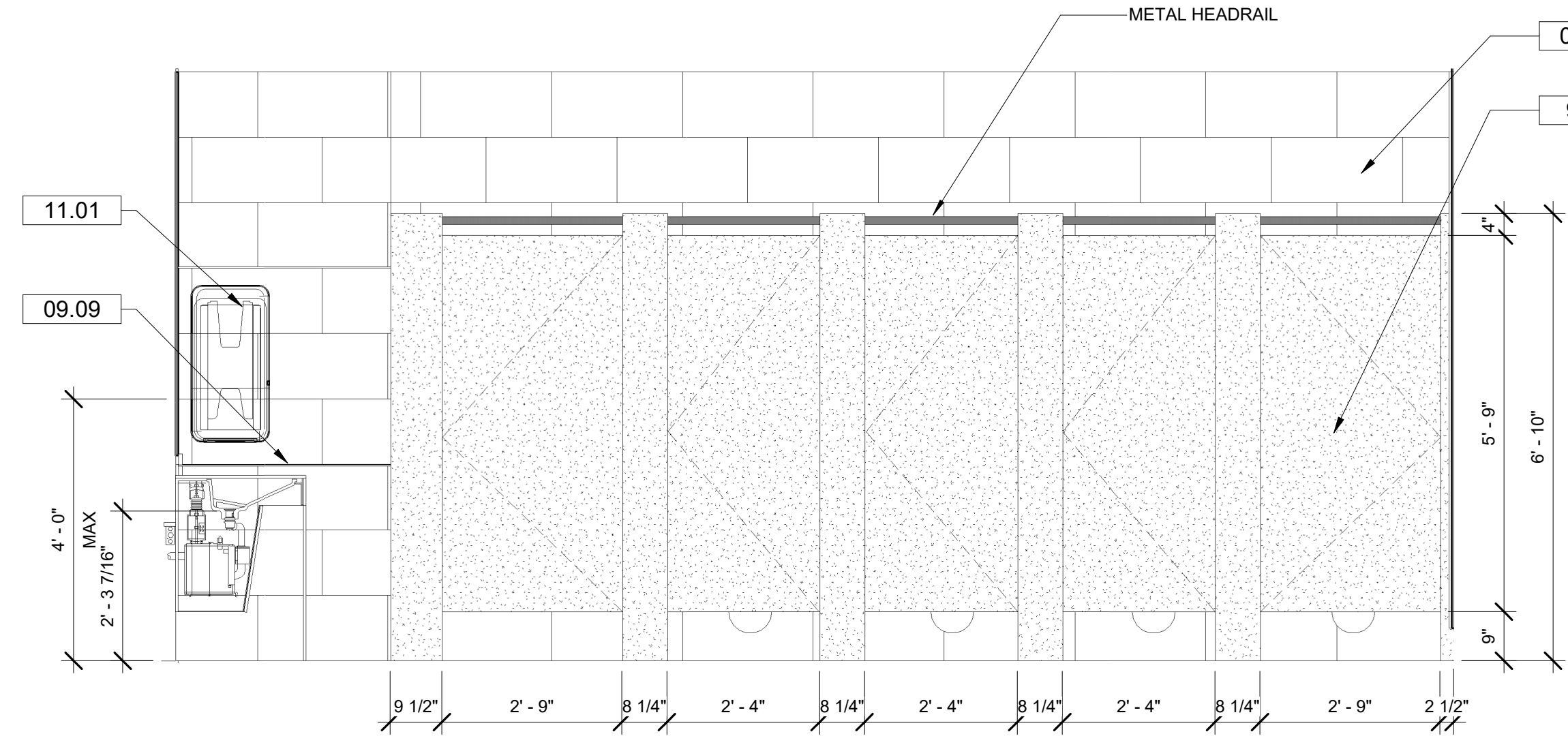
13 FAMILY RESTROOM
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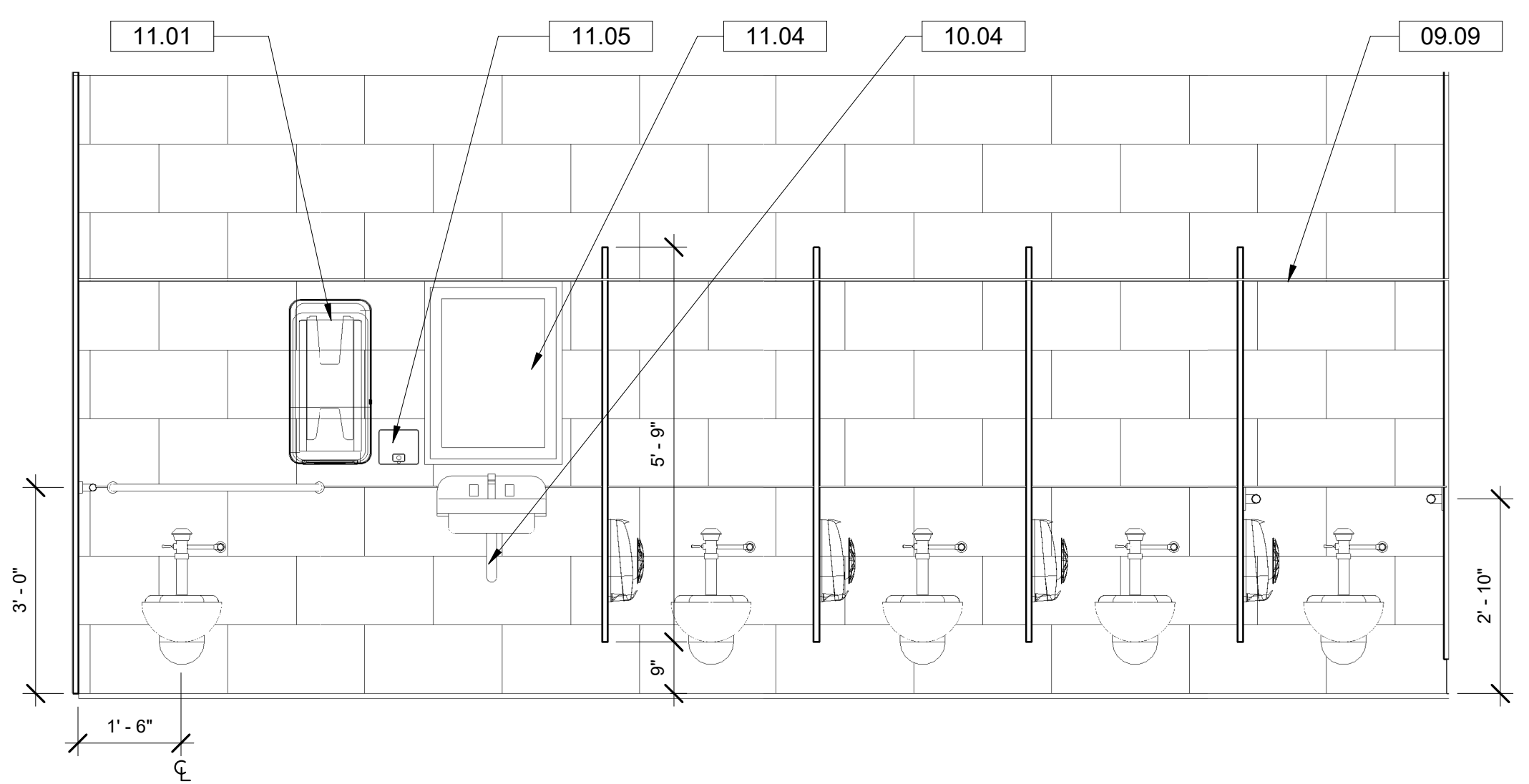
6 RESTROOM 6 - E. ELEV
SCALE: 1/2" = 1'-0"



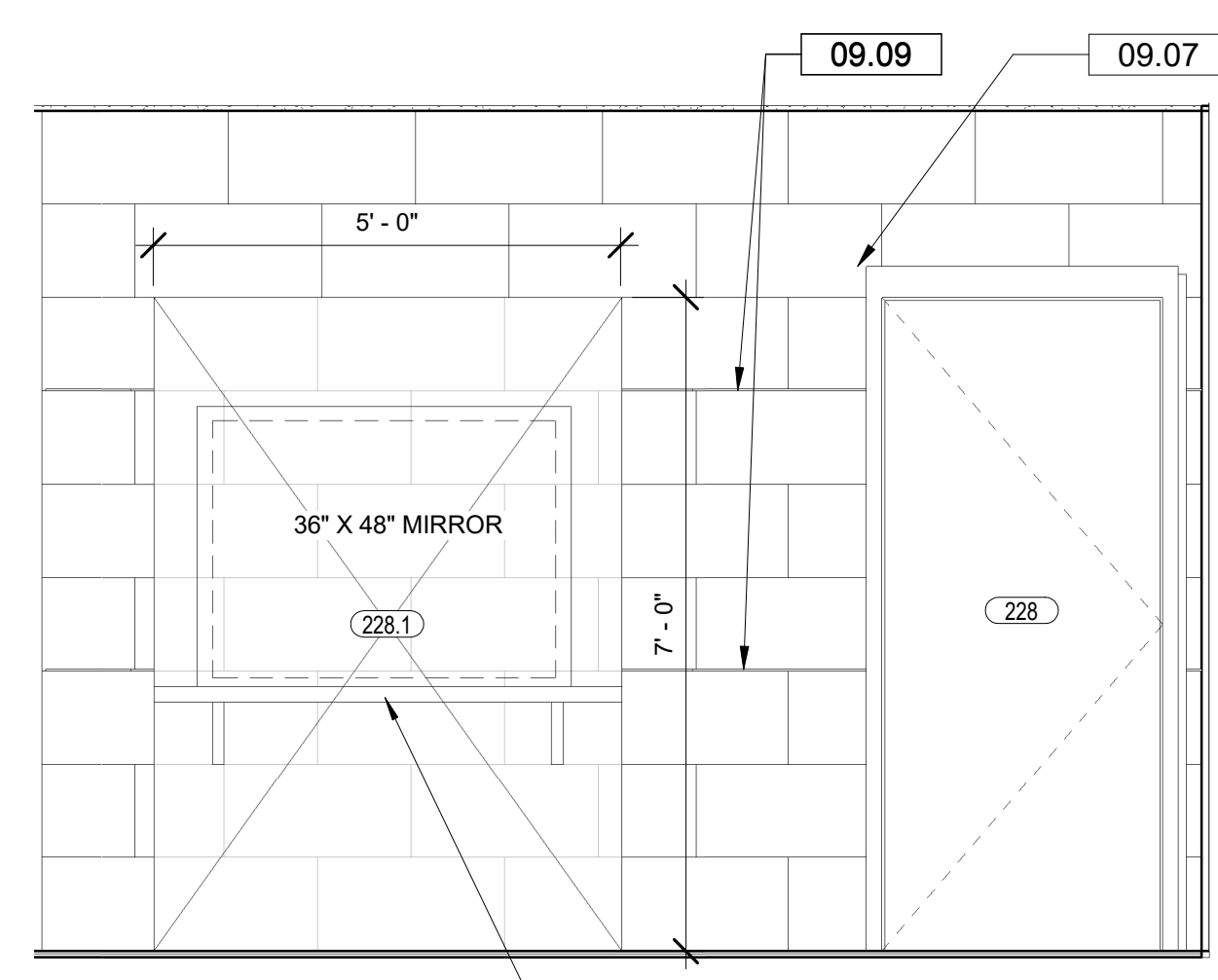
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SCALE: 1/2" = 1'-0"



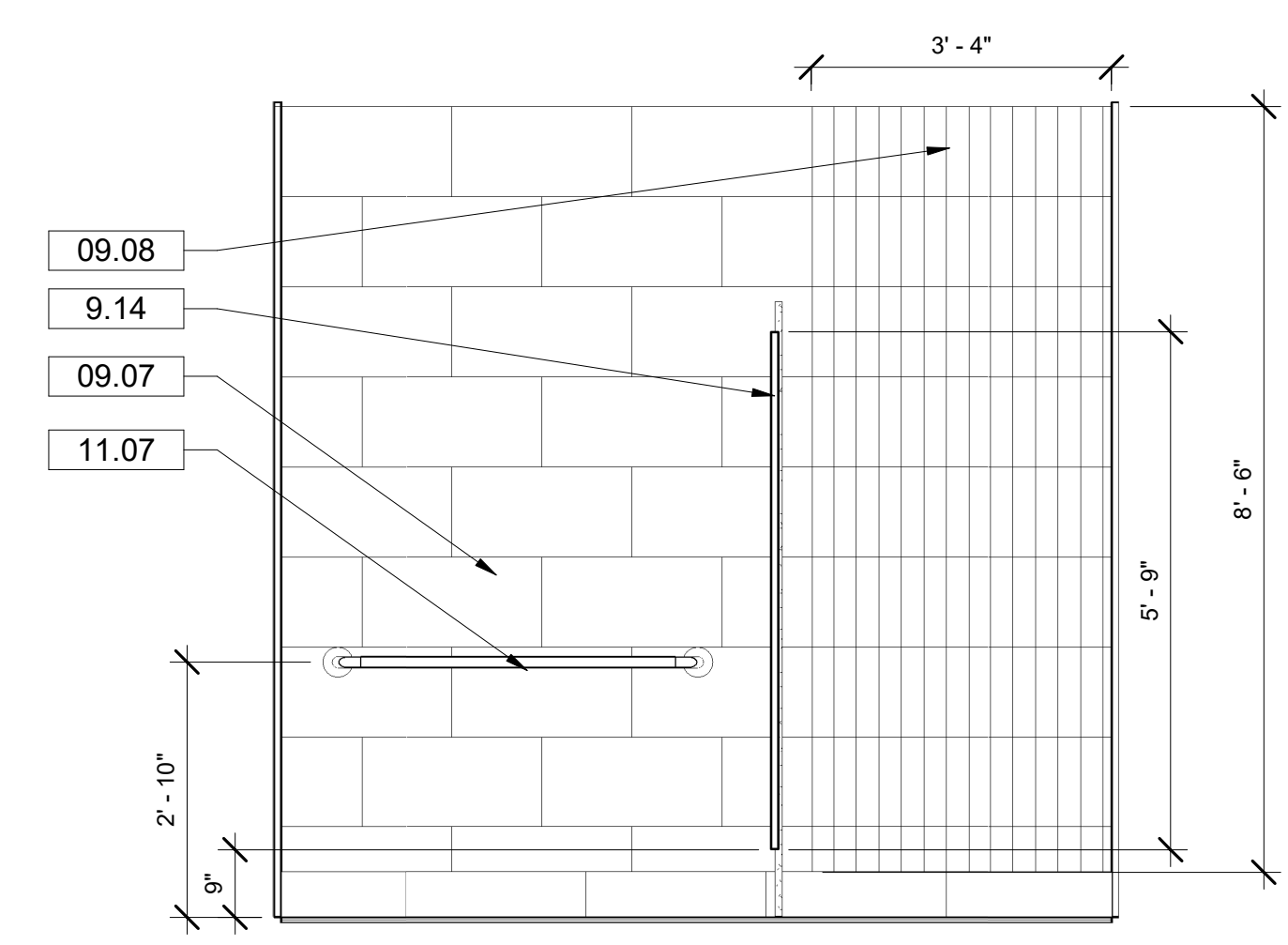
5 RESTROOM 6 - S. ELEV a
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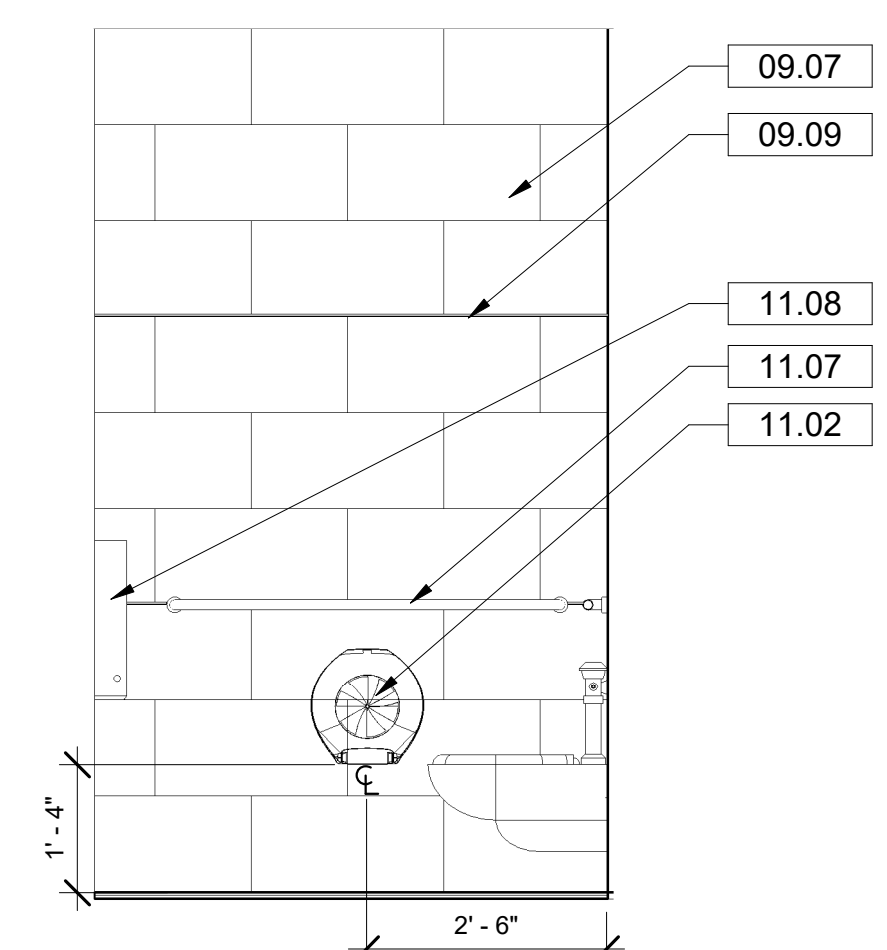
9 RESTROOM 6 - S. ELEV. b
SCALE: 1/2" = 1'-0"



4 RESTROOM 6 - W. ELEV a
SCALE: 1/2" = 1'-0"



8 RESTROOM 6 - W. ELEV b
SCALE: 1/2" = 1'-0"



12 FAMILY RESTROOM # - E. ELEV.
SCALE: 1/2" = 1'-0"

GEN. NOTES: ENLG. PLAN

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3. CONTRACTOR SHALL COORDINATE WORK WITH MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS.
4. REFER TO FINISH LEGEND ON SHEET A400 FOR MORE INFORMATION ABOUT FINISHES SHOWN ON THIS SHEET.
5. PROVIDE POSITIVE SLOPE TOWARDS ALL FLOOR DRAINS.
6. STALL DOORS SHOWN IN ENLARGED FLOOR PLANS AS A-H FOR PARTITION HARDWARE COORDINATION ONLY. NOT RELEVANT TO DOOR SCHEDULE.
7. AUTOMATIC SOAP DISPENSER AND FAUCET SPECIFIED BY PLUMBING ENGINEER.

GENERAL NOTES: RCP

1. SEE SHEET A400 FOR ROOM FINISH SCHEDULE FOR ADDITIONAL INFORMATION.
2. ALL ACCESS PANEL LOCATIONS TO BE COORDINATED WITH MECHANICAL, ELECTRICAL, PLUMBING AND FIRE SPRINKLER WORK.
3. REPLACE CEILING AT NEW HEIGHT IN RESTROOMS #1 TO #6.
4. SEE ELECTRICAL FOR LIGHTING FIXTURE SCHEDULE. WHERE APPLICABLE, ALL FIRE SPRINKLER HEADS AND ELECTRICAL FIXTURES SHALL BE CENTERED WITHIN CEILING TILES.
5. IF ANY ITEMS INDICATED ON THE DRAWINGS ARE IN CONFLICT WITH THE ARCHITECT'S CONTRACTORS ARE RESPONSIBLE FOR BRINGING TO ARCHITECT FOR FURTHER CLARIFICATION ON DESIGN INTENT.

KEYNOTES

NUMBER	DESCRIPTION
09.06	P-3 WATER RESISTANT PAINT SHERWIN WILLIAMS SW7757 HIGH REFLECTIVE WHITE FLAT (RESTROOM CEILING)
09.07	PT-1 PORCELAIN TILE: PORCELANOSA AVENUE GREY, 12X24, FINISH NATURAL
09.08	GT-1 GLASS TILE: BODESI GLASS TILE, 4X12 COLOR PEACOCK
09.09	GT-2 GLASS PENCIL LINER: ELIDA CERAMICA 12X0.51, GLOSSY (OR SIMILAR)
9.12	SS-3 SOLID SURFACE SINK SYSTEM WITH 3 STATION TROUGH, 2 INDIVIDUAL TROUGHS, AND 2 TRASH RECEPTACLE CUTOUTS. MATERIAL: PORCELANOSA KRION SOLID SURFACE ROYAL+ SERIES ELEGANT WHITE 9105-G7. MANUFACTURER AND INSTALL BY KRION
9.14	SS-2 SOLID SURFACE: PORCELANOSA KRION CARRARA DARK L103-G9. HARDWARE BY KRION MANUFACTURER PROVIDED
10.04	PROVIDE STANDARD PIPE WRAP AT LAV. FOR ANY EXPOSED INSTANCES. SEE PLUMBING FOR SPECIFICATION.
11.01	TORK HAND TOWEL DISPENSER, 562620, WHITE, OWNER PROVIDED, CONTRACTOR INSTALLED
11.02	TORK 3 ROLL BATH TISSUE ROLL DISPENSER, 568828, WHITE, OWNER PROVIDED, CONTRACTOR INSTALLED
11.03	MIRROR: PARIS MIRROR: LIGHTED MIRROR HARMONY: 24X48" LED 110V WIRING (Model # HARM48243000K-24x48)
11.04	MIRROR: PARIS MIRROR: LIGHTED MIRROR HARMONY: 24X32" LED 110V WIRING (Model # HARM24323000K-24x32)
11.05	ADA SOAP DISPENSER, OWNER FURNISHED, CONTRACTOR INSTALLED (SEE PLUMBING SPEC)
11.06	WATER COOLER SPECIFIED BY PLUMBING ENGINEER
11.07	GB: GRAB BAR (ADA HEIGHT) MOUNTED BETWEEN 33-36" AFF
11.08	CHANGING TABLE: KOALA KARE KB200-05, WHITE GRANITE MOUNTED 24" AFF
11.09	ADA ADULT TOILET (WALL MOUNTED) (SEE PLUMBING SPECS)

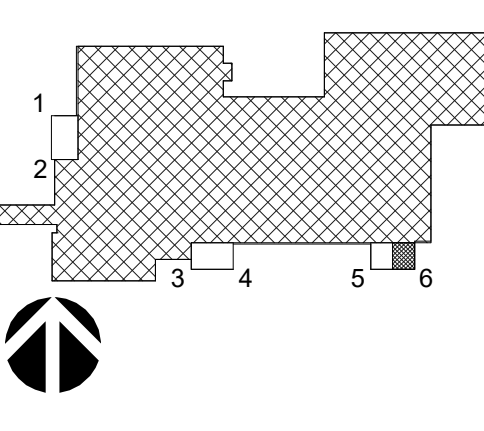


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HVAC UPGRADES & RESTROOM RENOVATIONS
 TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
 1250 MIRACLE STRIP PKWY SE
 FORT WALTON BEACH, FL 32548



REVISIONS:

No.	Description	Date

ENLARGED PLAN - RESTROOM 6

Project number	17057.8
Dated	04-12-21
PIC	Approver
PM	SLN

A406
Scale As indicated

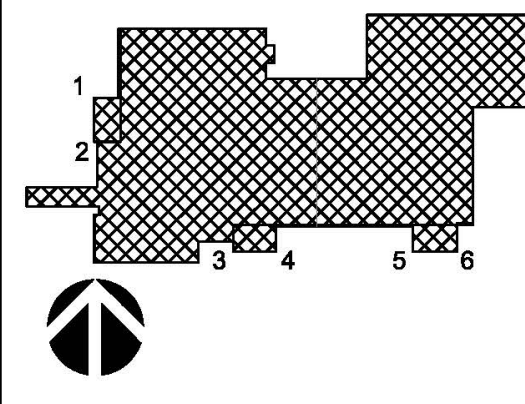


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 FORT WALTON BEACH, FL 32548



REVISIONS:

No.	Description	Date

**PLUMBING LEGEND,
SCHEDULE, DETAILS,
AND NOTES**

Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

P001
Scale As Indicated

GENERAL NOTES

- COORDINATE ALL PIPING WITH DUCTWORK SHOP DRAWINGS AND EXISTING CONDITIONS. ROUTE PIPING AS REQUIRED TO AVOID CONFLICTS.
- ALL PIPING PASSING THROUGH ANY WALL SHALL HAVE A SLEEVE PER SPECIFICATIONS.
- ALL PIPING PASSING THROUGH FIRE-RATED WALLS SHALL HAVE A FIRE-RATED SLEEVE PER SPECIFICATIONS. ALL PIPING PENETRATIONS THROUGH WALLS OR FLOORS SHALL BE SEALED TO EQUAL THE RATING OF THE WALLS OR FLOORS.
- ALL PIPING INDICATED IS ABOVE THE CEILING EXCEPT THE OBVIOUS SANITARY SOIL, WASTE, VENT AND POTABLE WATER PIPING BELOW FLOOR OR GRADE.
- SEE TOILET ROOM ELEVATIONS ON ARCHITECTURAL DRAWINGS FOR PLUMBING FIXTURE MOUNTING HEIGHT.
- COORDINATE EXACT LOCATION OF ALL EXTERIOR WALL HYDRANTS WITH ARCHITECTURAL DRAWINGS.
- PRIOR TO SUBSTANTIAL COMPLETION OF NEW AND ALTERED WORK AREAS, CONTRACTOR SHALL HAVE SANITARY PLUMBING SYSTEM CLEARED OF DEBRIS OR ANY MATTER THAT WOULD INTERFERE OR PREVENT ADEQUATE CONVEYANCE OF MATERIALS FROM MOVING THROUGH AND TERMINATING INTO BUILDING OR PUBLIC DISPOSAL FACILITIES.
- ALL WORK SHALL COMPLY WITH THE FLORIDA BUILDING CODE - PLUMBING SIXTH EDITION (2017).
- REFER TO M301 AND M302 FOR PIPE PENETRATIONS OF NEW FIRE WALLS.

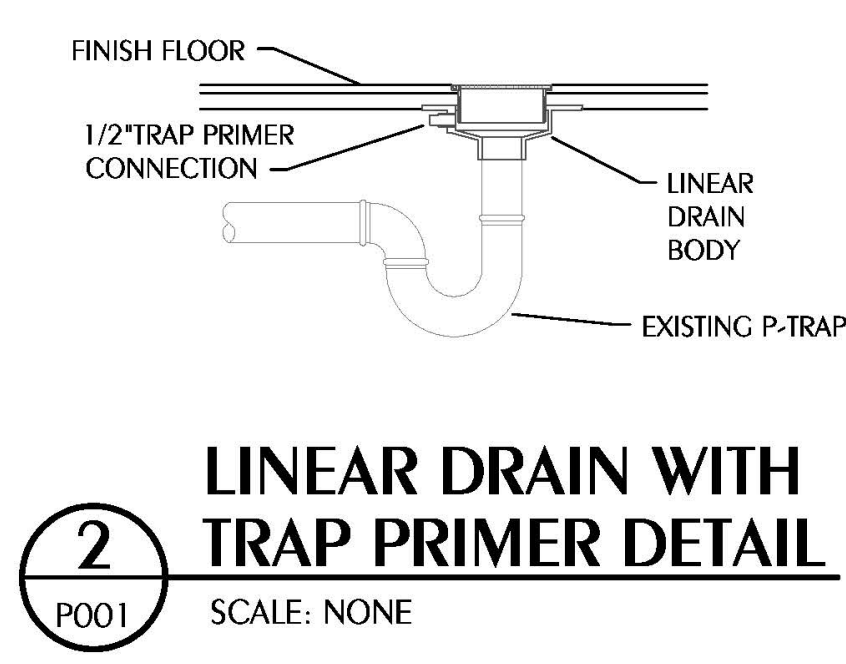
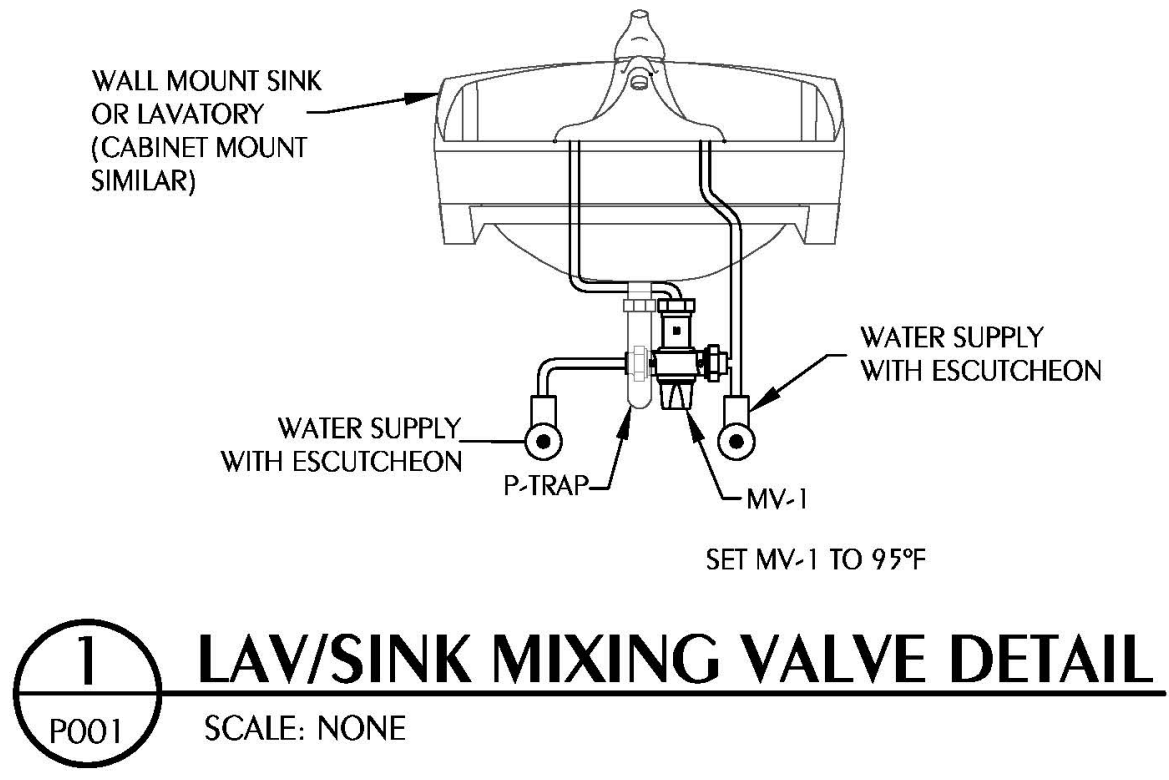
PLUMBING FIXTURE SCHEDULE

MARK	FIXTURE	PIPE SIZES-INCHES			REMARKS
		CW	HW	W	
WC-1	WATER CLOSET (HANDICAP, ELECTRONIC)	1	-	4	HANDICAP HEIGHT @ 17", WALL MOUNT, CARRIER, ELONGATED BOWL, 1-1/2" TOP SPUD, 1.1 GPF, HARDWIRED SENSOR OPERATED WITH MANUAL OVERRIDE, OPEN FRONT SEAT LESS COVER
WC-2	WATER CLOSET (STANDARD, ELECTRONIC)	1	-	4	STANDARD HEIGHT @ 15", WALL MOUNT, CARRIER, ELONGATED BOWL, 1-1/2" TOP SPUD, 1.1 GPF, HARDWIRED SENSOR OPERATED WITH MANUAL OVERRIDE, OPEN FRONT SEAT LESS COVER
UR-1	URINAL (ELECTRONIC)	3/4	-	2	WALL MOUNT, CARRIER, HARD WIRED SENSOR OPERATED FLUSH VALVE WITH MANUAL OVERRIDE, 3/4" TOP SPUD, COORDINATE WITH ARCH. DWCS, 0.125 GPF
UR-2	URINAL (HANDICAP, ELECTRONIC)	3/4	-	2	WALL MOUNT, CARRIER, HARD WIRED SENSOR OPERATED FLUSH VALVE WITH MANUAL OVERRIDE, 3/4" TOP SPUD, COORDINATE WITH ARCH. DWCS, 0.125 GPF
L-1	LAVATORY (HANDICAP, 20"X18")	3/8	3/8	1-1/4	WALL MOUNT, CHAIR CARRIER, VITREOUS CHINA, CENTER HOLE, INSULATION KIT, MIXING VALVE, POLISHED CHROME PLATED MANUAL METERED FAUCET, 0.5 GPM, P-TRAP, TAILPIECE, STOPS & SUPPLIES
L-2	SOLID SURFACE COUNTER WITH INTEGRAL BASIN(S)	3/8	3/8	1-1/4	BRUSHED NICKEL BATTERY POWERED SENSOR OPERATED FAUCET WITH BRUSHED NICKEL BATTERY POWERED SENSOR OPERATED SOAP DISPENSER FOR EACH STATION. TAILPIECE, STOPS AND SUPPLIES FOR EACH STATION. 0.5 GPM FAUCET
L-3	INTEGRATED SINK (1 STATION)	3/8	3/8	1-1/4	BRUSHED NICKEL BATTERY POWERED SENSOR OPERATED FAUCET WITH BRUSHED NICKEL BATTERY POWERED SENSOR OPERATED SOAP DISPENSER FOR EACH STATION. TAILPIECE, STOPS AND SUPPLIES FOR EACH STATION. 0.5 GPM FAUCET
EWC-1	ELECTRIC WATER COOLER (DUAL LEVEL)	3/8	-	1-1/4	IN WALL MOUNT, CHAIR CARRIER, DUAL LEVEL, SELF CONTAINED, STAINLESS STEEL, PUSH BUTTON, SENSOR ACTIVATED BOTTLE FILL STATION
3"FD	SQUARE FLOOR DRAIN (6"X6")	-	-	3	SQUARE POLISHED NICKEL BRONZE TOP FLOOR DRAIN, DURA-COATED CAST IRON BODY WITH BOTTOM OUTLET
WH	RECESSED WALL HYDRANT / HOSE BIB	3/4	-	-	FLUSH MOUNTING WALL BOX, BRASS, CHROME FINISH, ANTI-SIPHON VACUUM BREAKER, DUAL CHECK VALVE, INTEGRAL SERVICE SHUT-OFF VALVE, WHEEL HANDLE (ACORN 8160)

- WATER SUPPLY TAPPING TO EACH PLUMBING FIXTURE SHALL BE FULL SIZE (MINIMUM).
- SEE ELECTRICAL DWCS FOR FINAL POWER REQUIREMENTS.
- PROVIDE WATER HAMMER ARRESTORS ON HOT AND COLD WATER SUPPLY BRANCHES SERVING SINGULAR, MULTIPLE, OR GROUPS OF PLUMBING FIXTURES. ADHERENCE TO THE PLUMBING AND DRAINAGE INSTITUTE STANDARD P.D.I.-WD201 (PER SPECIFICATIONS) SHALL BE EMPLOYED IN DETERMINING PROPER SIZE, SELECTION, PLACEMENT, LOCATION, AND INSTALLATION OF ARRESTORS.

LEGEND

- S or W SOIL OR WASTE PIPING
- V VENT PIPING
- CW COLD WATER SUPPLY PIPING
- HW HOT WATER SUPPLY PIPING
- HWR HOT WATER RETURN PIPING
- GAS C GAS PIPING
- GV GATE VALVE
- CV CHECK VALVE
- BV BALL VALVE
- HB HOSE BIBB
- WH WALL HYDRANT
- CO CLEANOUT TO FLOOR
- FD FLOOR DRAIN
- COTS CLEANOUT TO SIDEWALK
- UNION
- VW VENT THRU WALL
- SHEET NOTE
- POINT OF CONNECTION TO EXISTING
- WC WATER CLOSET
- TP TRAP PRIMER
- EWH ELECTRIC WATER HEATER
- WHA WATER HAMMER ARRESTOR TYPE A
- WHB WATER HAMMER ARRESTOR TYPE B
- WHC WATER HAMMER ARRESTOR TYPE C
- L LAVATORY
- UR URINAL
- KW KILOWATT
- (E) EXISTING
- WCO WALL CLEANOUT
- MR MOP RECEPTOR
- MV MIXING VALVE
- WV WET VENT
- WH WALL HYDRANT
- HB HOSE BIBB
- HD HUB DRAIN WITH EDPM OR SILICON TRAP SEAL
- TW TEMPERED WATER SUPPLY PIPING
- RTC RUNNING TRAP CLEANOUT
- UHF-1(M) EQUIPMENT TAG, (M) INDICATES MECHANICAL EQUIPMENT. REFER TO M SHEETS



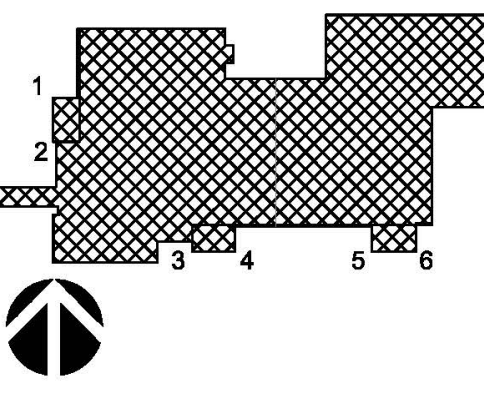


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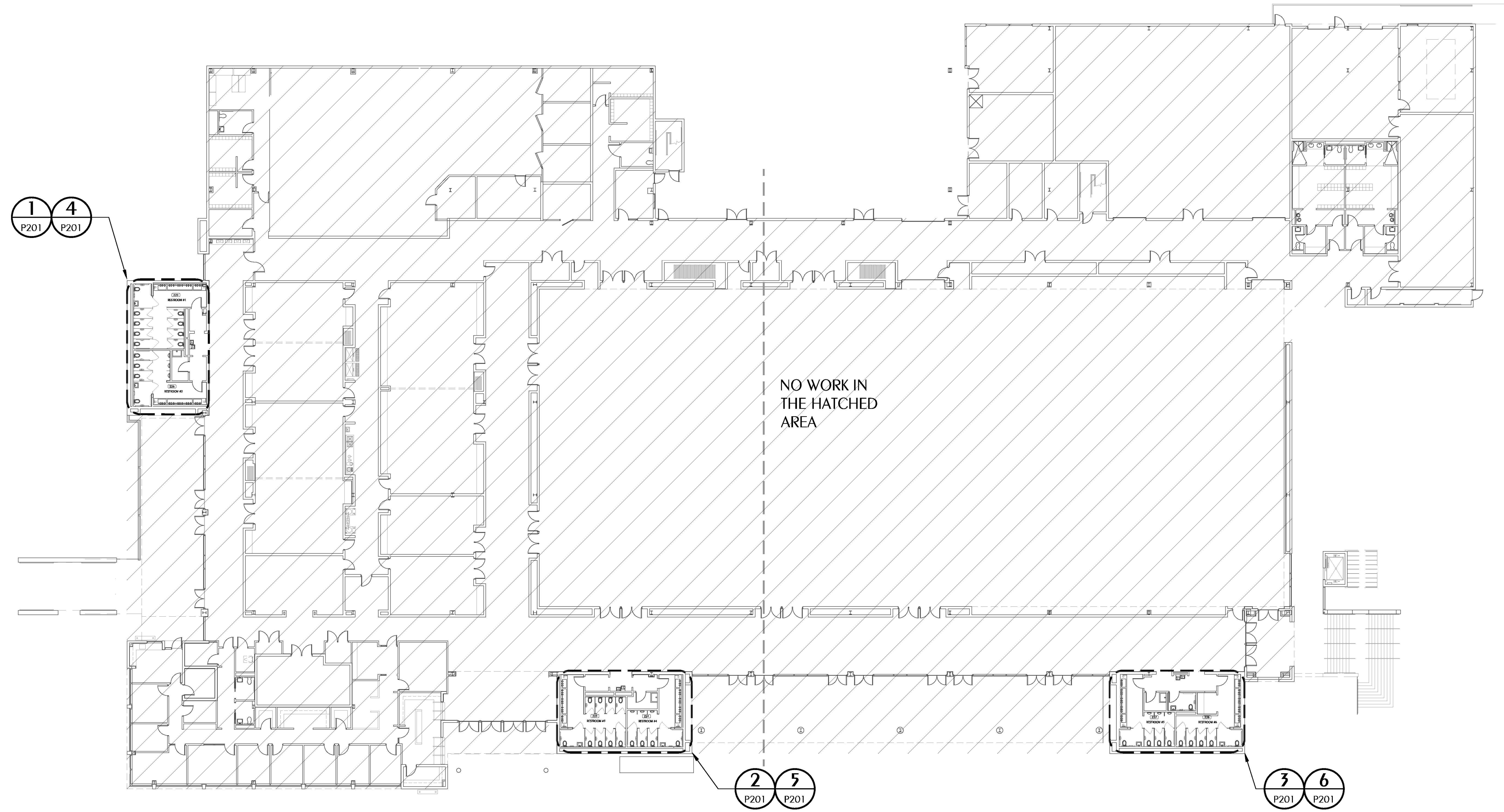
REVISIONS:

No.	Description	Date

PLUMBING OVERALL PLANS

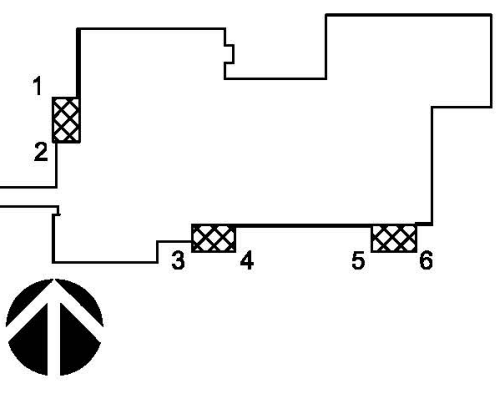
Project number	17057.8
Dated	04-12-21
PIC	DNW
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P101
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1 PLUMBING OVERALL PLAN
 SCALE: 1/16" = 1'-0"





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No.	Description	Date

PLUMBING ENLARGED PLANS

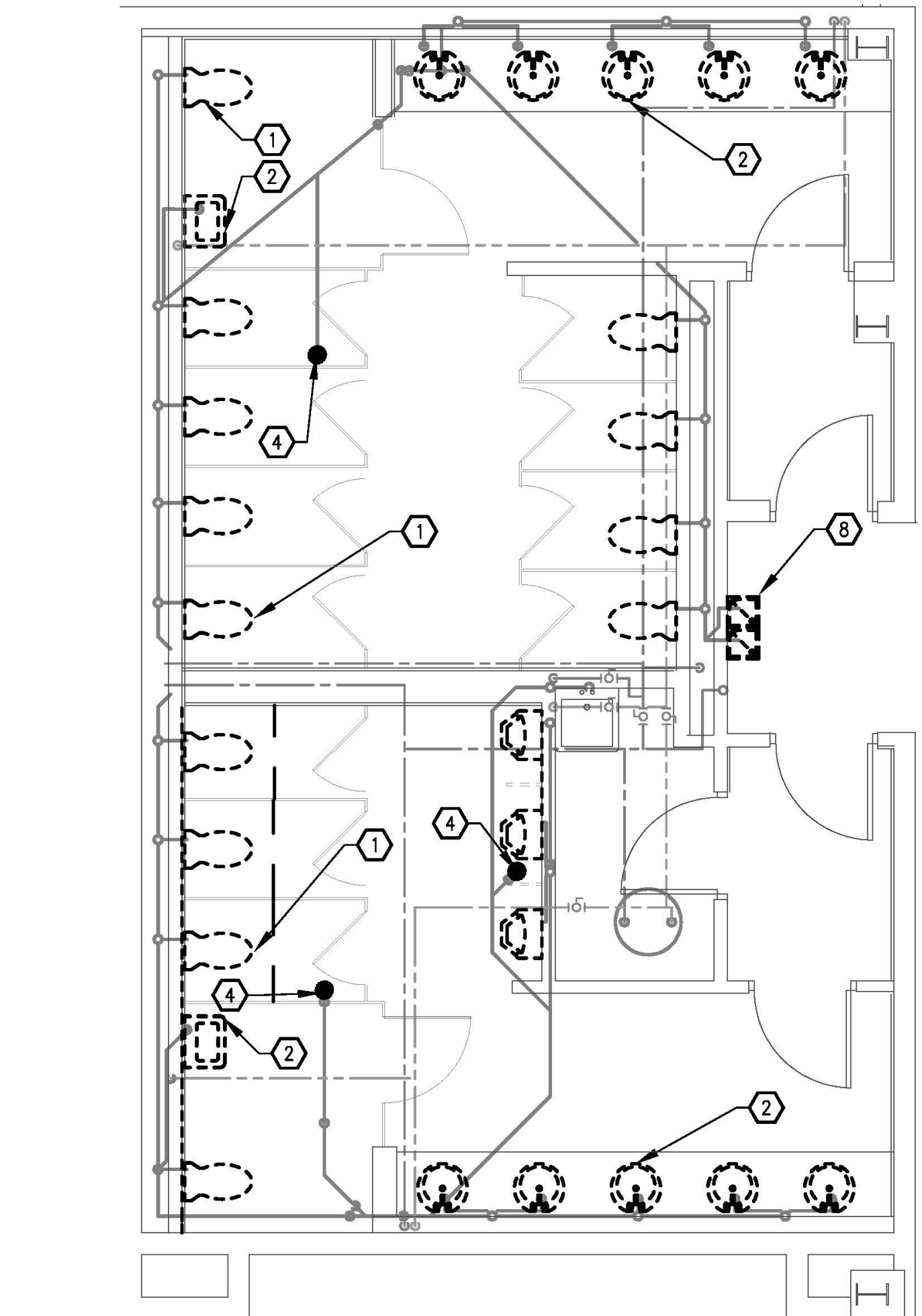
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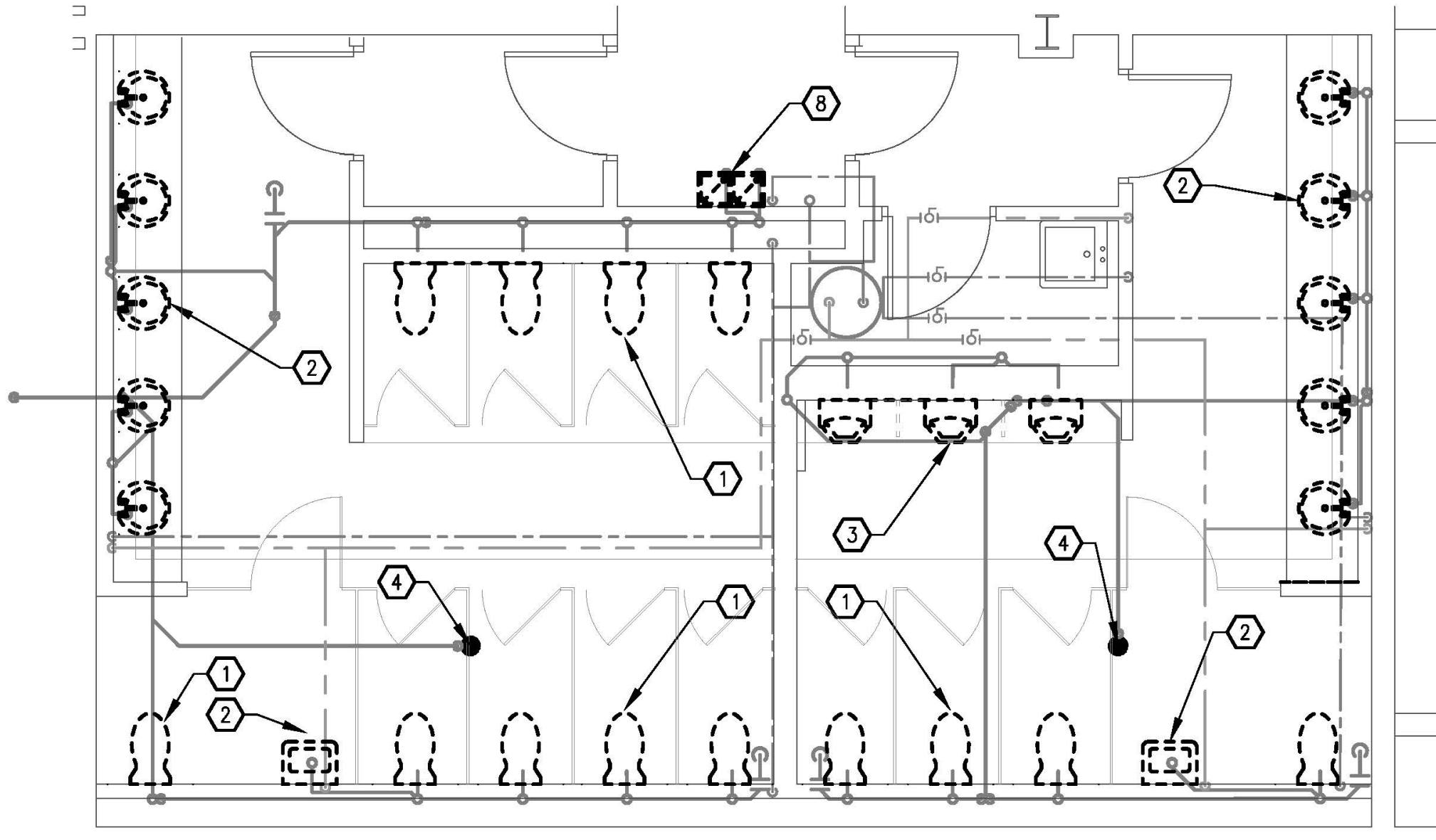
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SHEET NOTES

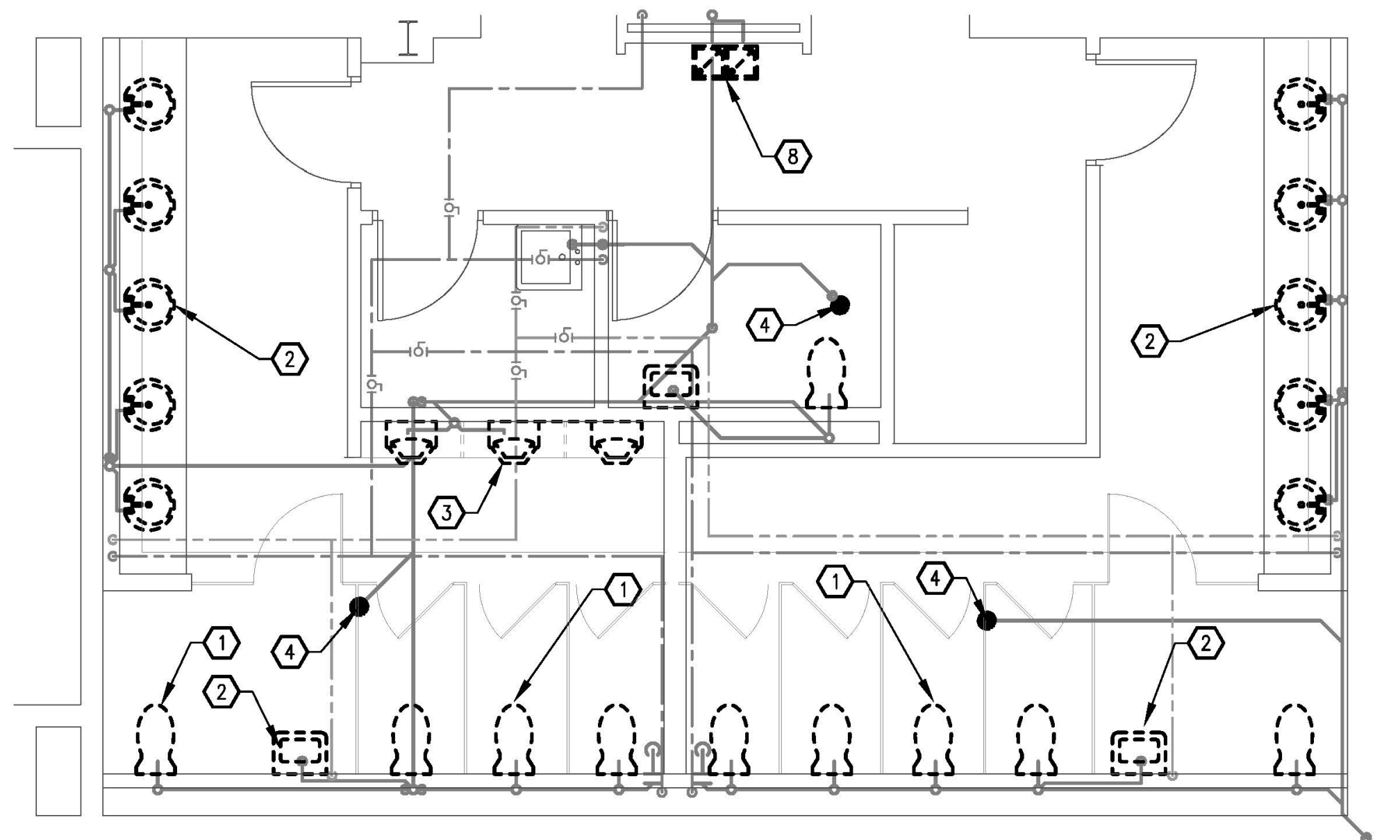
- 1 REMOVE EXISTING WATER CLOSET. PREPARE TO REPLACE WITH NEW. TYPICAL.
- 2 REMOVE EXISTING LAVATORY. PREPARE TO REPLACE WITH NEW. TYPICAL.
- 3 REMOVE EXISTING URINAL. PREPARE TO REPLACE WITH NEW. TYPICAL.
- 4 REMOVE EXISTING FLOOR DRAIN. SAWCUT SLAB TO PREPARE FOR INSTALLATION OF NEW LINEAR DRAIN. TYPICAL.
- 5 CONNECT NEW FIXTURE TO EXISTING DOMESTIC WATER AND SANITARY PIPING IN THE AREA. TYPICAL.
- 6 CONNECT NEW LAVATORY TO EXISTING DOMESTIC WATER AND SANITARY PIPING IN THE AREA. LAVATORY SHALL HAVE THREE FAUCETS AND TWO DRAINS.
- 7 PROVIDE NEW WALL HYDRANT. CONNECT TO EXISTING 3/4" CW IN AREA.
- 8 REMOVE EXISTING ELECTRIC WATER COOLER. PREPARE TO REPLACE WITH NEW.
- 9 CONNECT NEW LAVATORY TO EXISTING DOMESTIC WATER AND SANITARY PIPING IN THE AREA. LAVATORY HAS ONE FAUCET AND ONE DRAIN.
- 10 PROVIDE NEW CLEANOUT COVER IN FINISHED WALL AT EXISTING CLEANOUT LOCATION.
- 11 SEAL PIPE AROUND NEW FIRE RATED WALL. REFER TO M301 AND M302.
- 12 INSULATE EXISTING 4" HORIZONTAL STORMWATER PIPING WITH 1/2" THICK FLEXIBLE UNICELLULAR PIPE INSULATION. INSULATION SHALL BE ASTM C534, TYPE 1.
- 13 REUSE EXISTING FIXTURE CARRIER.



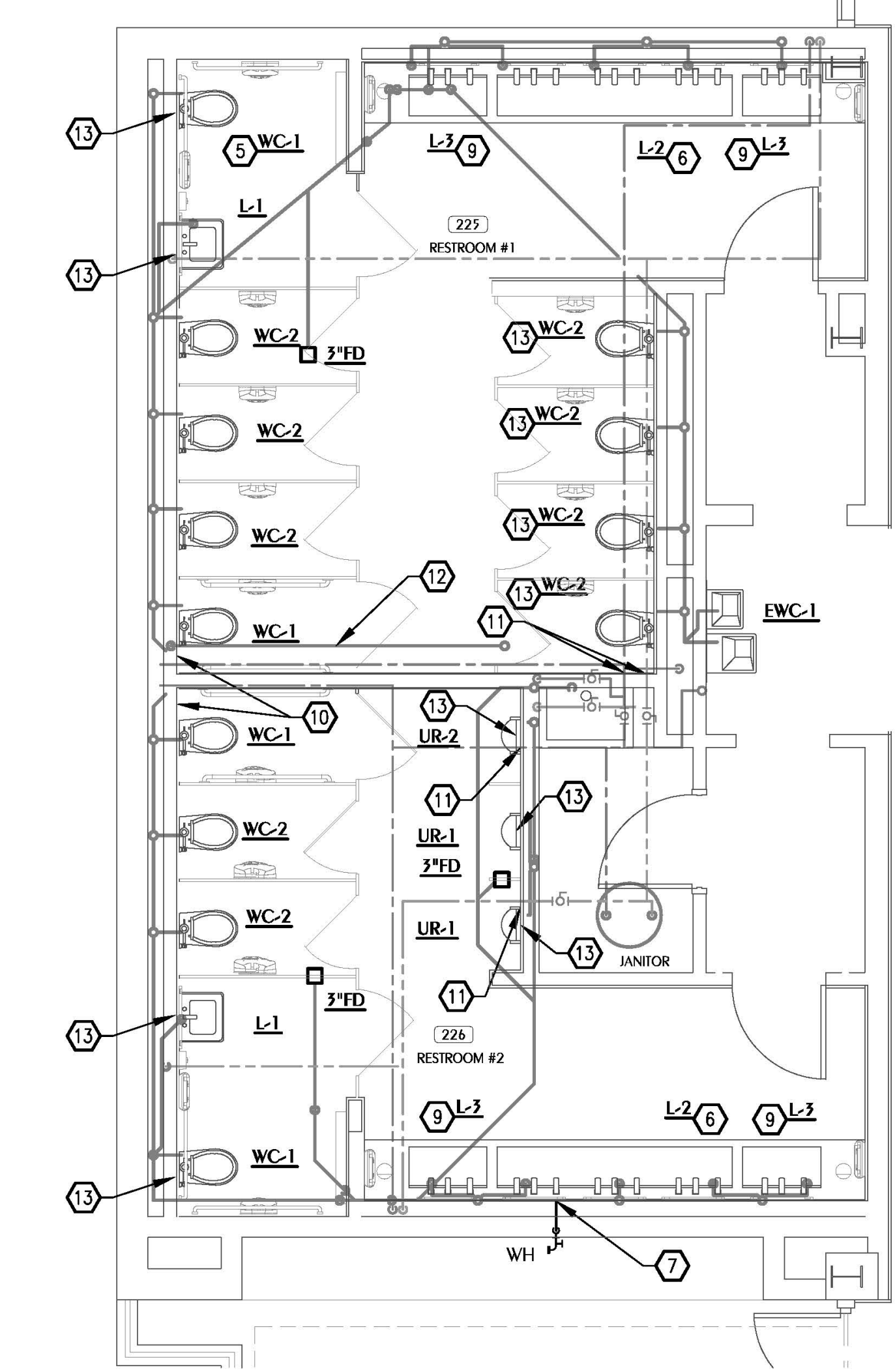
1 RESTROOM 1 & 2 PLUMBING DEMOLITION PLAN
P201 SCALE: 1/4" = 1'-0"



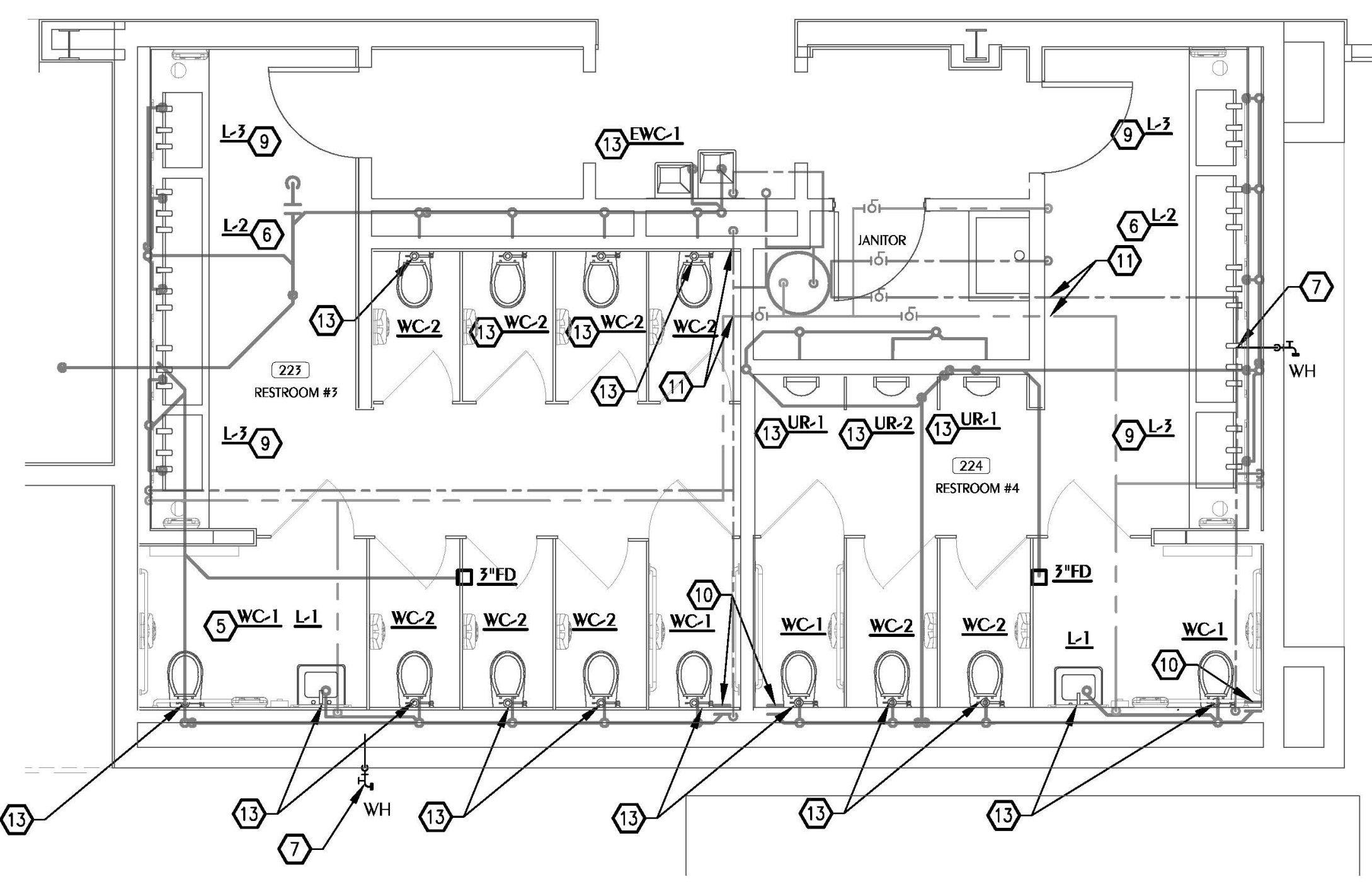
2 RESTROOM 3 & 4 PLUMBING DEMOLITION PLAN
P201 SCALE: 1/4" = 1'-0"



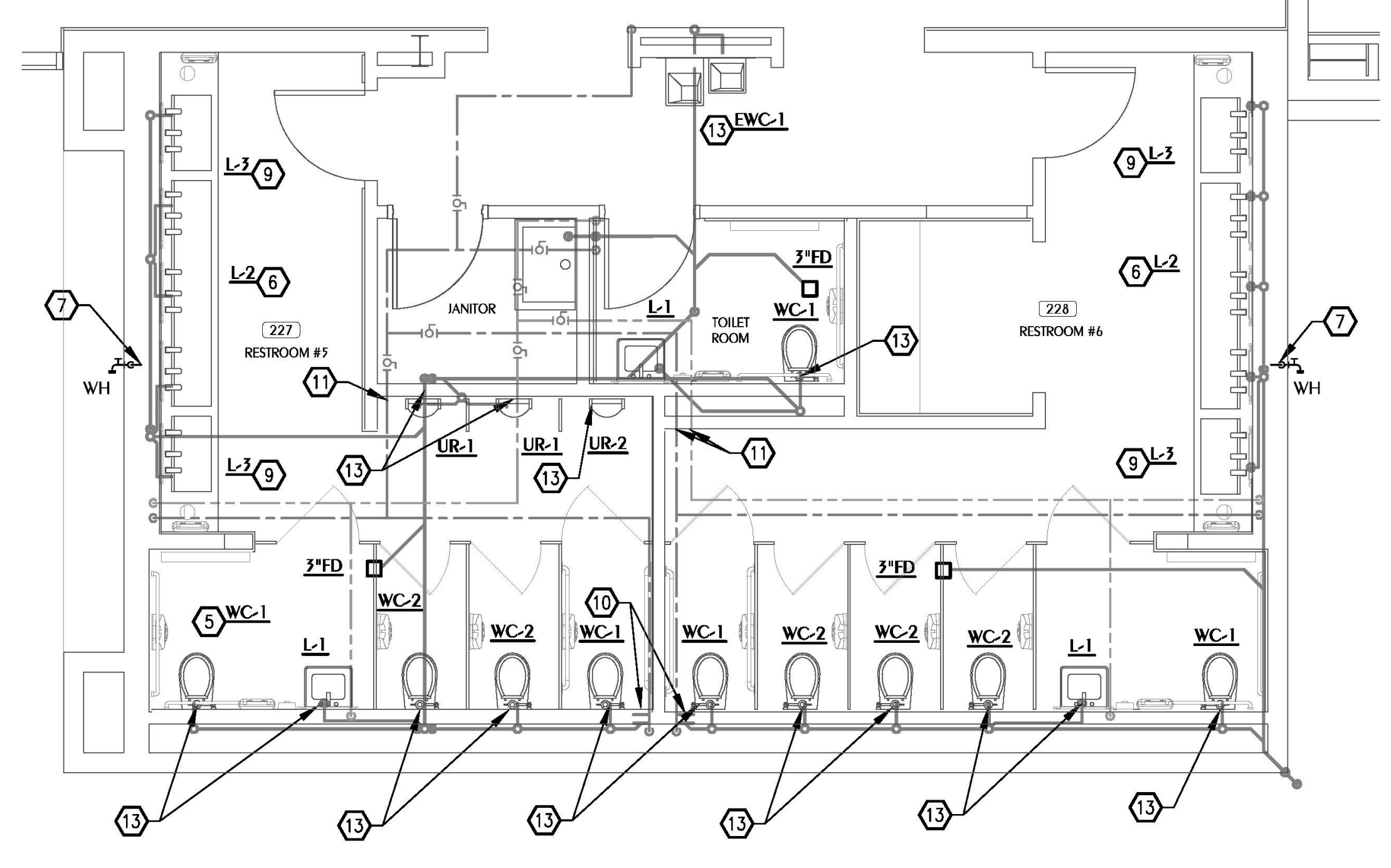
3 RESTROOM 5 & 6 PLUMBING DEMOLITION PLAN
P201 SCALE: 1/4" = 1'-0"



4 RESTROOM 1 & 2 PLUMBING NEW WORK PLAN
P201 SCALE: 1/4" = 1'-0"



5 RESTROOM 3 & 4 PLUMBING NEW WORK PLAN
P201 SCALE: 1/4" = 1'-0"



6 RESTROOM 5 & 6 PLUMBING NEW WORK PLAN
P201 SCALE: 1/4" = 1'-0"

LEGEND

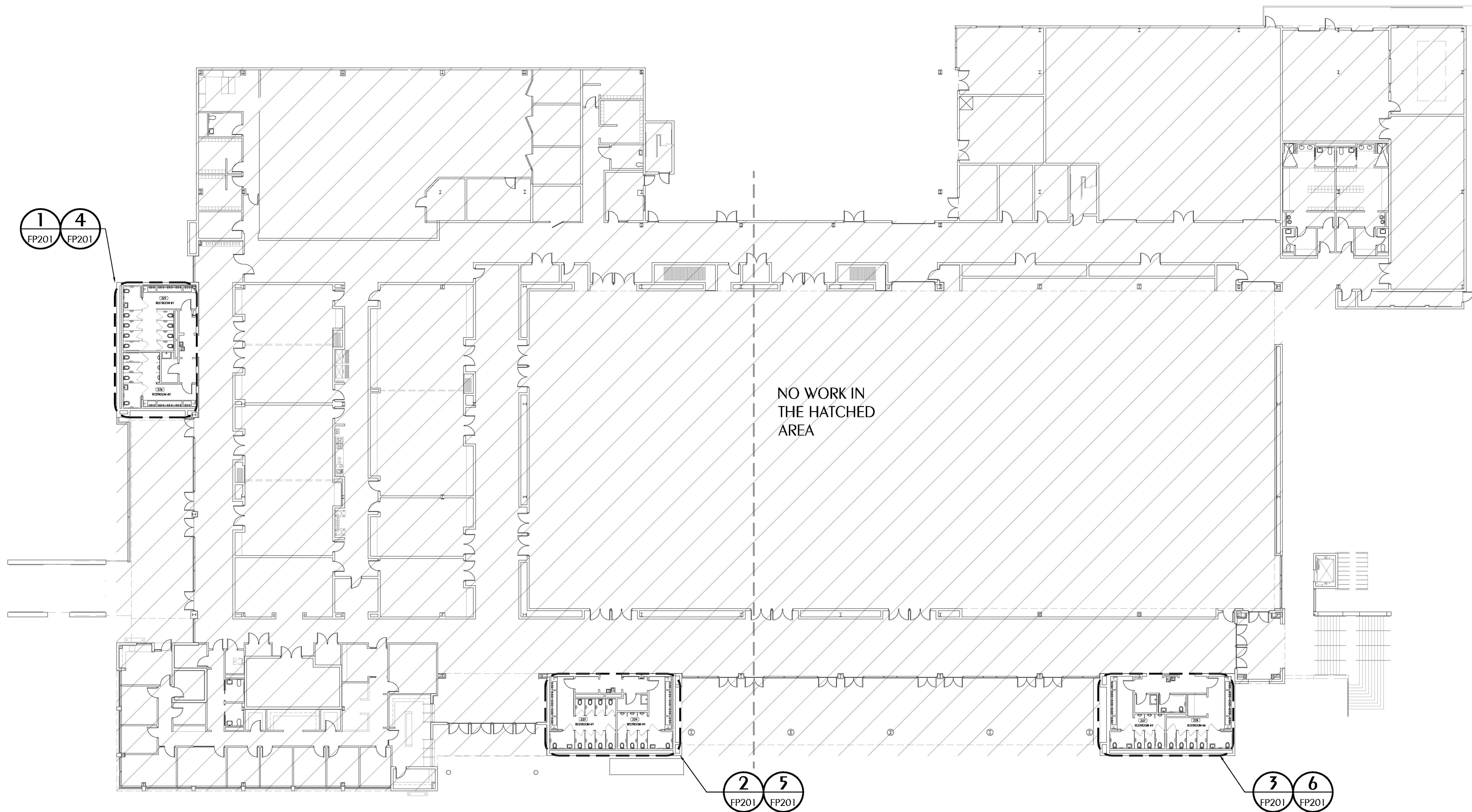
- FW FIRE WATER SUPPLY
- PW POTABLE WATER SUPPLY
- SPRINKLER HEAD

GENERAL NOTES

1. IT IS NOTED THAT SOME AREAS WILL BE REQUIRED TO BE PROTECTED AS ORDINARY HAZARD (MECHANICAL ROOMS, ETC.) THESE AREAS HAVE BEEN IDENTIFIED BY A DIFFERENT HATCHING PATTERN THEN THE LIGHT HAZARD AREAS ON THE PLANS.
2. MAINTAIN THE INTEGRITY OF ALL FIRE RATED ASSEMBLIES AND ACOUSTICAL ASSEMBLIES.
3. CONTRACTOR SHALL COORDINATE SYSTEM DESIGN WITH ALL OTHER TRADES.
4. ALL PIPING SHALL OBSERVE PROPER PITCH. PROVIDE DRAINS FOR LOW POINTS.
5. PIPE HANGERS SHALL BE INSTALLED AS REQUIRED BY NFPA 13 FOR SUPPORTING SPRINKLER PIPING. NO OTHER PIPING OR DEVICES SHALL BE ATTACHED TO THE SPRINKLER HANGER SYSTEM UNLESS THE HANGER HAS BEEN DESIGNED TO CARRY THE ADDITIONAL LOAD.
6. THIS CONTRACT DOES NOT INCLUDE ANY MATERIAL OR DEVICE TO IMPROVE THE STRUCTURAL STRENGTH OF THE BUILDING TO ENABLE IT TO CARRY THE LOAD OF THE FIRE PROTECTION SYSTEM.
7. ALL ABOVE GROUND WET SPRINKLER PIPE THAT IS THREADED SHALL BE SCHEDULE 40 BLACK WITH BLACK CAST/MALEABLE IRON FITTINGS WITH JOINTS PER NFPA 13. TEFLON TAPE SHALL BE ADDED TO ALL MALE THREADS OF PIPE AS A JOINING COMPOUND. CPVC PIPING IS NOT ACCEPTABLE.
8. ALL ABOVE GROUND WET SYSTEM SPRINKLER PIPE THAT IS WELDED OR ROLL-GROOVED SHALL BE SCHEDULE 10 BLACK WITH BLACK CAST/MALEABLE IRON FITTINGS WITH JOINTS PER NFPA 13. CPVC PIPING IS NOT ACCEPTABLE.
9. INSTALL SPRINKLER HEADS CENTER OF TILE IN ACOUSTICAL CEILINGS. HEAD LOCATIONS SHALL BE GUIDED BY ARCHITECTURAL ELEMENTS FOR OTHER CEILING TYPES.
10. ALL WORK SHALL COMPLY WITH SIXTH EDITION (2017) OF FLORIDA BUILDING CODE, NFPA 13-2019, AND SIXTH EDITION (2017) FLORIDA FIRE PREVENTION CODE.
11. REFER TO M301 AND M302 FOR PIPE PENETRATIONS OF NEW FIRE WALLS.

WATER BASED SPRINKLER SYSTEM REQUIREMENTS

1. THE PROJECT IS A MODIFICATION OF EXISTING FIRE SPRINKLER SYSTEM. NO CHANGE IN POINT OF SERVICE OF WATER SUPPLY WILL OCCUR.
2. THE BUILDING SHALL BE FULLY SPRINKLED IN ACCORDANCE WITH THE MOST RECENT EDITION OF NFPA 13 AND LOCAL CODES.
3. THERE IS NO CHANGE TO HAZARD CLASSIFICATION OF THE AFFECTED ROOMS.
4. THE MODIFICATION TO EXISTING SHALL BE HYDRAULICALLY CALCULATED IN ACCORDANCE WITH NFPA 13.
5. THE POINT OF SERVICE CONNECTION IS EXISTING, AND WILL NOT BE MODIFIED WITH THIS PROJECT.
6. NO NEW FLOW TEST IS REQUIRED FOR THIS MODIFICATION TO EXISTING SYSTEM.
7. THE EXISTING RISER WILL NOT BE MODIFIED WITH THIS PROJECT.
8. MICROBIAL INDUCED CORROSION IS NOT ANTICIPATED IN THIS PROJECT.
9. BACKFLOW PREVENTER IS EXISTING AND WILL NOT BE MODIFIED WITH THIS PROJECT.
10. REFER TO GENERAL NOTES FOR QUALITY AND PERFORMANCE SPECIFICATIONS OF ALL FIRE PROTECTION COMPONENTS.
11. NO FIRE PUMP IS REQUIRED.
12. NO ON SITE FIREWATER STORAGE TANK IS REQUIRED.



1 FIRE PROTECTION OVERALL PLAN
 SCALE: 1/16" = 1'-0"

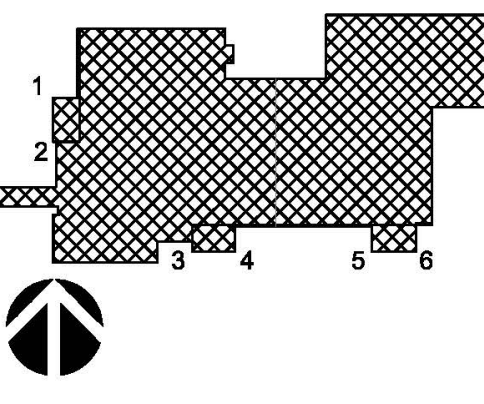


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 TASK ORDER NO. 8 & NO. 5 - C-18-2638-TDD
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 FORT WALTON BEACH, FL 32548



REVISIONS:

No.	Description	Date

FIRE PROTECTION OVERALL PLAN

Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

FP101

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SHEET NOTES

- ① REMOVE EXISTING FIRE SPRINKLER HEAD. PREPARE FOR INSTALLATION OF NEW SPRINKLER HEAD. TYPICAL.
- ② PROVIDE NEW SPRINKLER HEAD. HEAD SHALL BE RECESSED PENDANT, CHROME, WITH A K-FACTOR OF 3.6 TO MATCH EXISTING SPRINKLER HEADS. CONNECT TO EXISTING FIRE SPRINKLER PIPING. TYPICAL.
- ③ SEAL PIPE PENETRATION OF NEW FIRE WALL PER 2/M302.

DAG

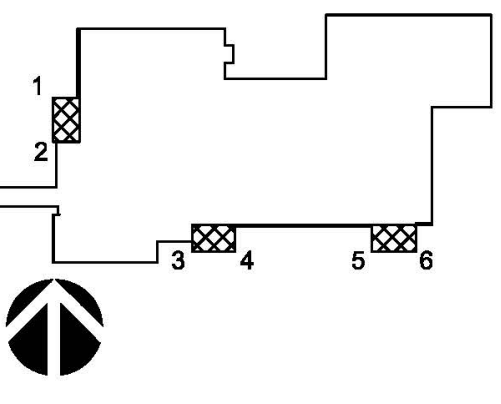
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HVAC UPGRADES & RESTROOM RENOVATIONS**

TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
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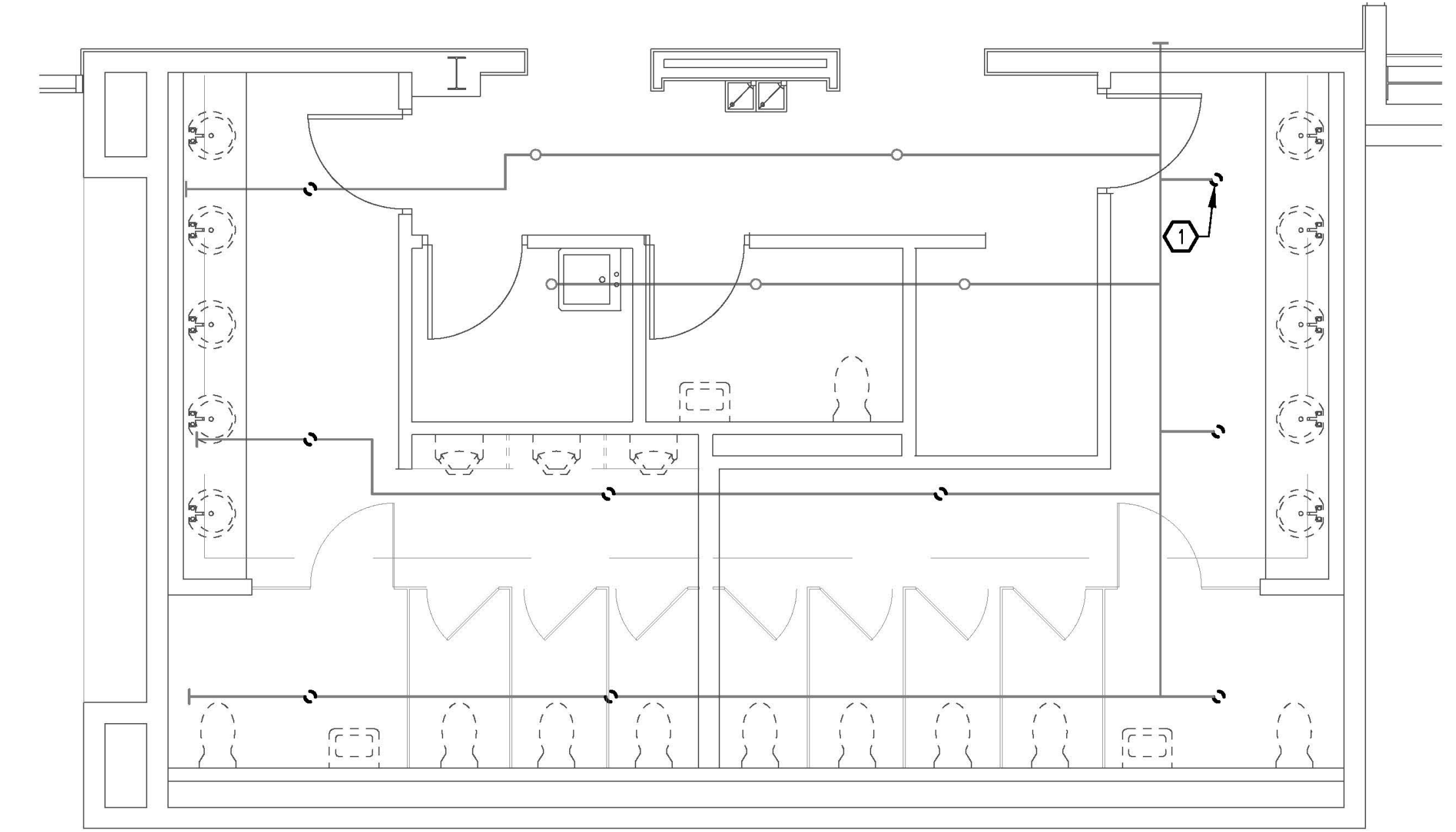
No.	Description	Date

FIRE PROTECTION ENLARGED PLANS

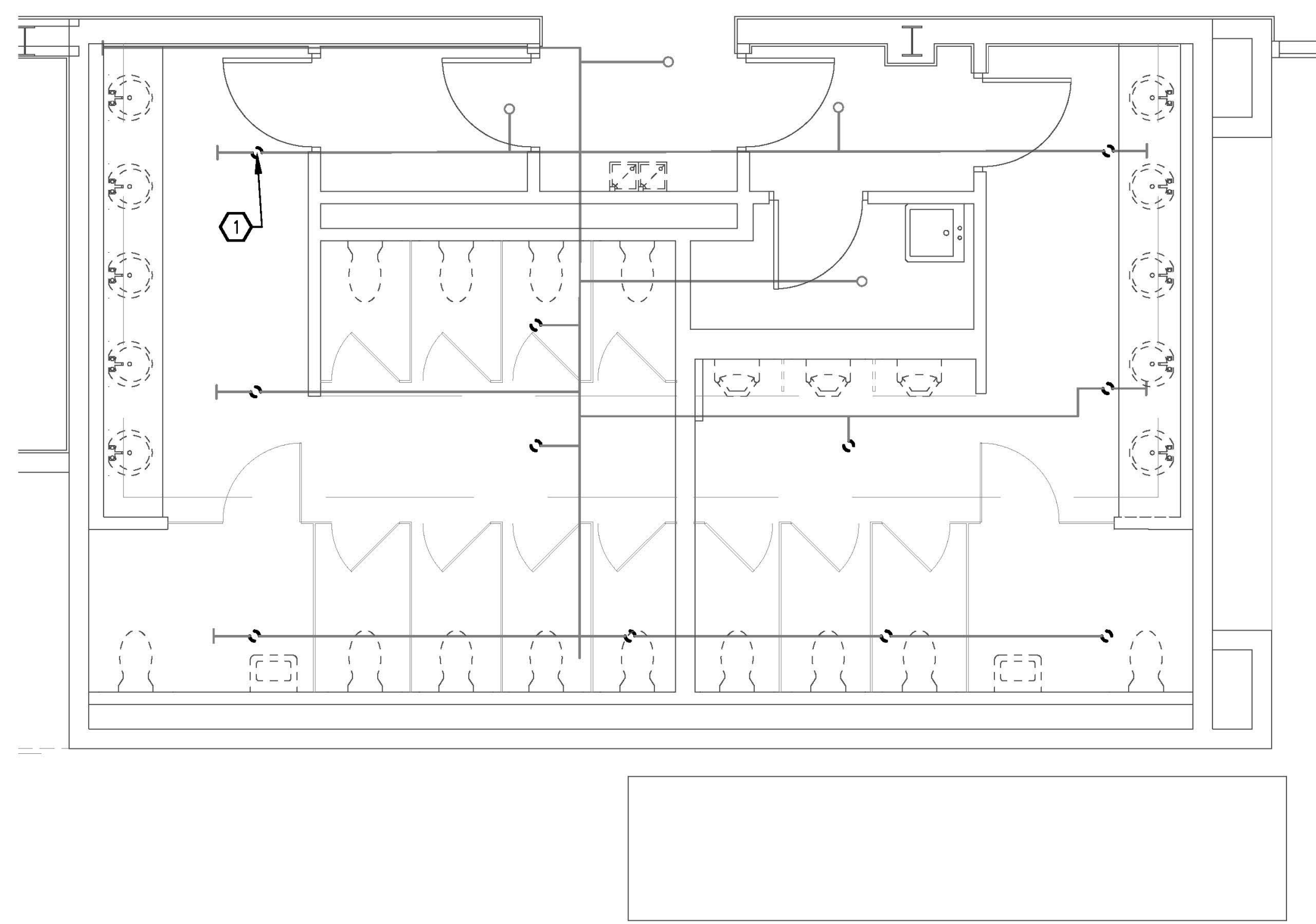
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FP201
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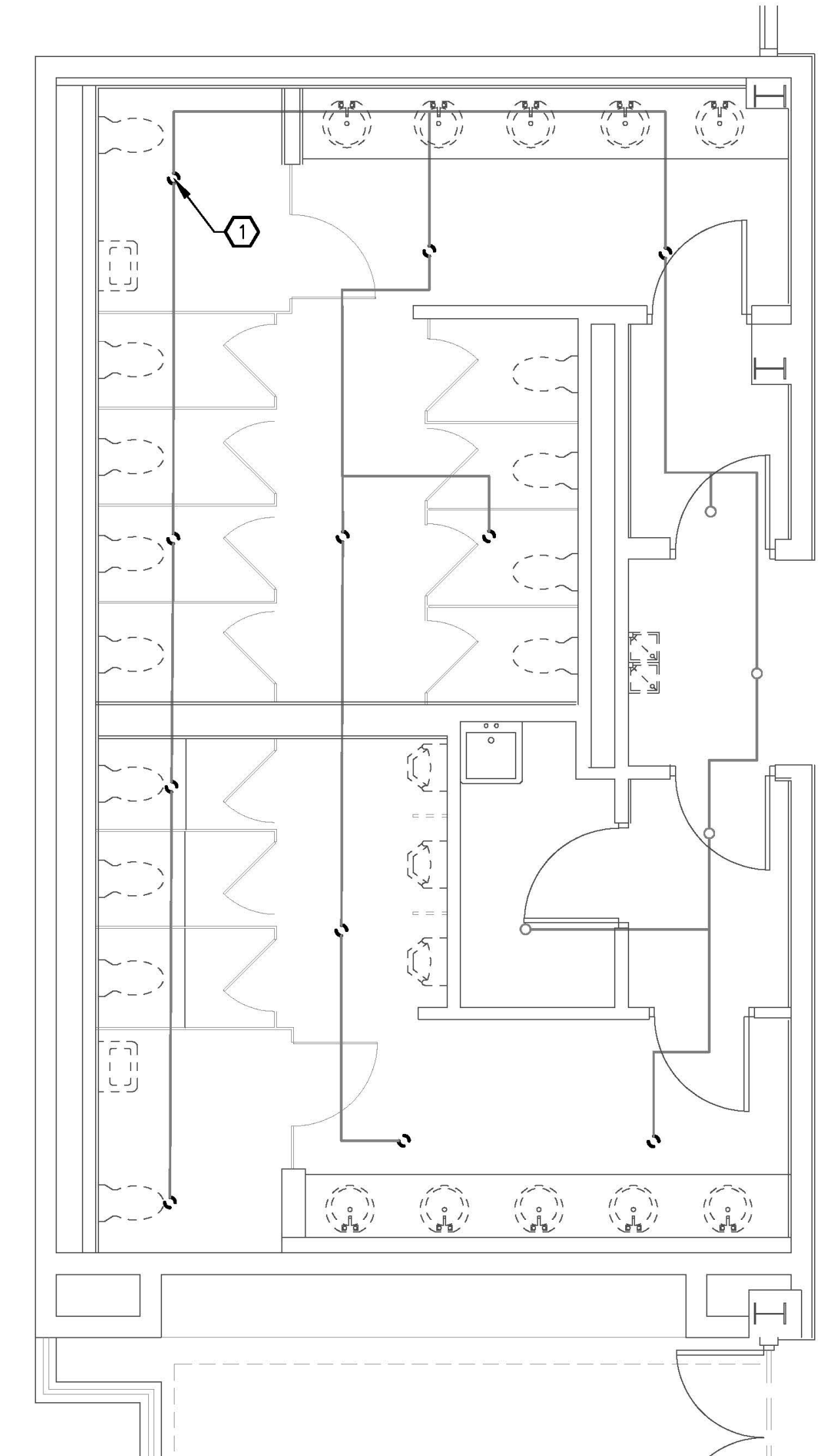
WATFORD ENGINEERING
850.525.5447
4452 Christ Street
Meridian, Florida 32450
Florida License Number: 27025
David N. Wallace, P.E.
Florida License Number: 62228
Project Number: 2020-008



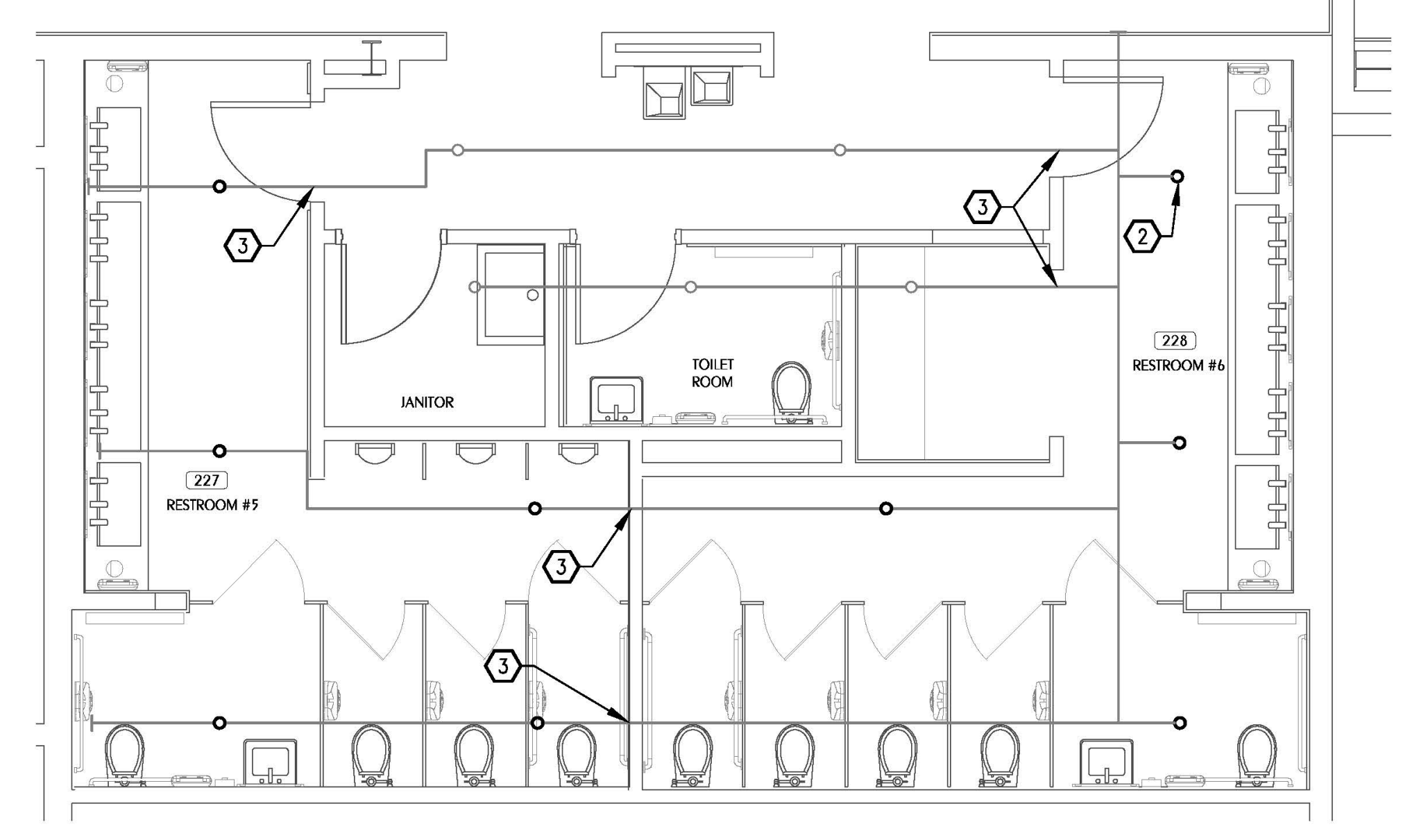
3 RESTROOM 5 & 6 FIRE PROTECTION DEMOLITION PLAN
SCALE: 1/4" = 1'-0"



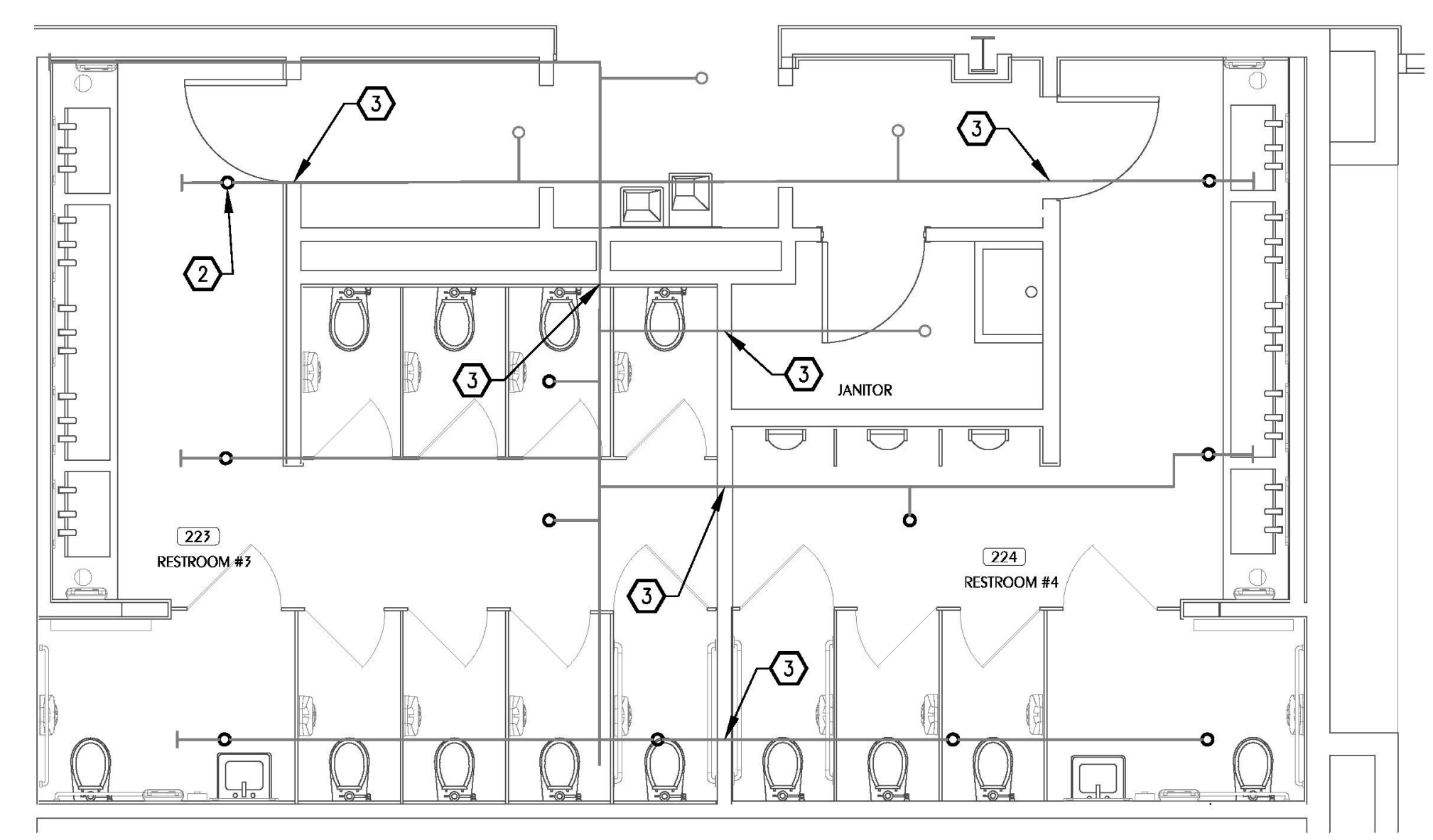
2 RESTROOM 3 & 4 FIRE PROTECTION DEMOLITION PLAN
SCALE: 1/4" = 1'-0"



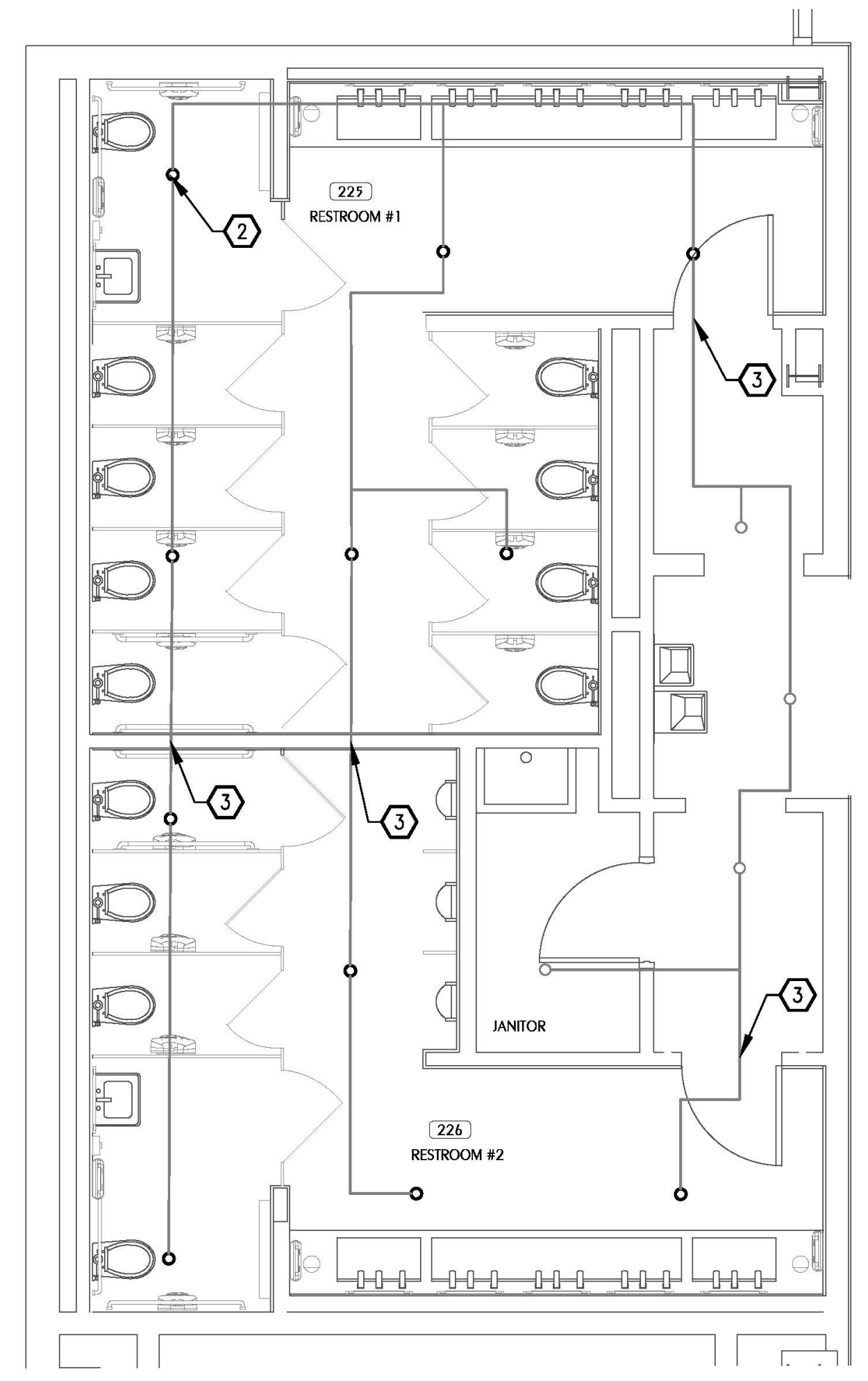
1 RESTROOM 1 & 2 FIRE PROTECTION DEMOLITION PLAN
SCALE: 1/4" = 1'-0"



6 RESTROOM 5 & 6 FIRE PROTECTION NEW WORK PLAN
SCALE: 1/4" = 1'-0"



5 RESTROOM 3 & 4 FIRE PROTECTION NEW WORK PLAN
SCALE: 1/4" = 1'-0"



4 RESTROOM 1 & 2 FIRE PROTECTION NEW WORK PLAN
SCALE: 1/4" = 1'-0"

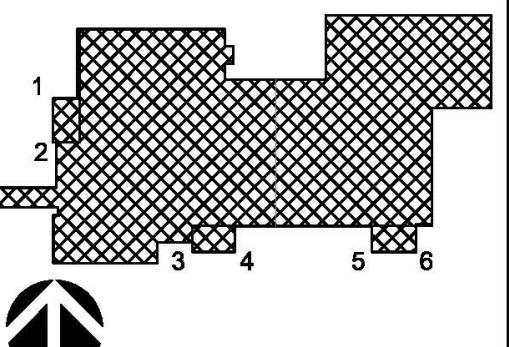


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BID DOCUMENTS

DESTIN FORT WALTON BEACH CONVENTION CENTER HVAC UPGRADES & RESTROOM RENOVATIONS TASK ORDER NO. 8 & NO. 5 - C-18-2638-TDD 1250 MIRACLE STRIP PKWY SE FORT WALTON BEACH, FL 32548



REVISIONS table with columns: No., Description, Date

Project information including Project number 17057.8, Date 04-12-21, PIC DNW, PM KAJ, and M100 logo.

DUCTWORK AND INSULATION GENERAL NOTES

- 1. ALL ROUND FLEXIBLE DUCT SHALL BE FLEXMASTER TYPE 8M OR ENGINEER APPROVED EQUAL... 2. SEAL ALL DUCT PENETRATIONS OF WALLS AND FLOORS AIRTIGHT... 3. UNLESS OTHERWISE INDICATED, ALL SUPPLY AIR DUCTWORK... 4. ALL SUPPLY AIR DUCTWORK DOWNSTREAM OF TERMINAL UNITS... 5. ALL RETURN AIR DUCTWORK SHALL BE LOW PRESSURE RECTANGULAR... 6. ALL OUTSIDE AIR INTAKE DUCTWORK SHALL BE LOW PRESSURE RECTANGULAR... 7. STANDARD EXHAUST AIR DUCTWORK SHALL BE LOW PRESSURE RECTANGULAR... 8. AVOID ROUTING DUCTWORK AND TUS WITHIN 6' OF TOP OF LIGHT FIXTURES... 9. PROVIDE MVD'S AT ALL TAKEOFFS FROM MAIN DUCTS.

AIR DEVICE SCHEDULE

Table with columns: MARK, MAX AIRFLOW CFM, AIR DEVICE SIZE, DUCT CONNECTION SIZE, TITUS MODEL. Includes rows for CD-1, CD-2, XE-1, and XE-2.

- NOTES: 1. MAX NC=20 2. PROVIDE 2x2 LAY IN PANEL FOR AIR DEVICES IN LAY IN CEILING. 3. PROVIDE BEVELED MOUNTING FRAME FOR CEILING DIFFUSERS IN HARD CEILING. 4. PROVIDE FLAT MOUNTING FRAME FOR GRILLES LOCATED IN HARD CEILING. 5. PROVIDE IMSA DIFFUSER IN VERTICAL OPERATION.

LOUVER SCHEDULE

Table with columns: MARK, AIRFLOW CFM (MAX), LOUVER SIZE (WxH) INCHES, FREE AREA FT² (MIN). Includes rows for LVR-1 through LVR-6.

- 1. PROVIDE GREENHECK MODEL 'EHV-901D' (OR EQUAL) EXTRUDED ALUMINUM, WIND-DRIVEN RAIN RESISTANT, STATIONARY LOUVER WITH BIRDSCREEN AND FLORIDA PRODUCT APPROVAL. 2. FINISH TO BE SELECTED BY ARCHITECT FROM MANUFACTURER'S STANDARD COLORS.

VENTILATION SCHEDULE

Table with columns: SPACE TYPE, VENTILATION CFM/S.F., VENTILATION CFM/PERSON, EXHAUST CFM. Lists spaces like CORRIDOR, RECEPTION, STORAGE, OFFICE, CONFERENCE, BREAK, MULTIPURPOSE ASSEMBLY, STAGE, DRESSING ROOM, RESTROOM-INTERMITTENT, RESTROOM-CONTINUOUS, SHOWER-CONTINUOUS, JANITORS CLOSETS.

NOTE: VENTILATION IS IN COMPLIANCE WITH ASHRAE STANDARD 62.1-2016. BIPOLAR IONIZATION IS UTILIZED TO CLEAN INDOOR AIR AND MAINTAIN ACCEPTABLE INDOOR AIR QUALITY WITH A REDUCTION IN OUTDOOR AIRFLOW. REFER TO M102 FOR VENTILATION SCHEDULES.

GENERAL NOTES

- 1. ALL DUCT DIMENSIONS ARE NET INSIDE. 2. VERIFY COLLAR SIZES ON ALL AIR TERMINALS, EQUIPMENT OUTLETS AND INLETS, TRANSITION DUCTWORK AS NECESSARY... 3. FIELD VERIFY CLEAR SPACE AVAILABLE, ROUTING PATH, AND CONFLICTS WITH STRUCTURE AND THE WORK OF OTHER TRADES... 4. CONTRACTOR SHALL INSTALL ALL EQUIPMENT, PIPING, AND DUCTWORK... 5. PROVIDE DUCT FLEX CONNECTIONS & VIBRATION ISOLATION... 6. WASTE VENT STACKS, EXHAUST FANS, ETC. SHALL BE A MINIMUM OF 10 FT. FROM OUTSIDE AIR INTAKES. 7. ALL SUPPLY, RETURN, EXHAUST AND OUTSIDE AIR INTAKE DUCTWORK SHALL BE GALVANIZED SHEET METAL. 8. ALL AHU FILTERS SHALL BE OF A READILY AVAILABLE SIZE, OF DISPOSABLE TYPE, AND BE ACCESSIBLE WITHOUT THE USE OF SCREWS OR OTHER MECHANICAL DEVICES... 9. PROVIDE ACCESS PANELS IN HARD CEILING AS REQUIRED FOR MAINTENANCE AND ADJUSTMENT OF EQUIPMENT LOCATED ABOVE CEILING. 10. ALL BIRD AND INSECT SCREENS SHALL BE ANODIZED ALUMINUM. 11. BECAUSE OF THE SMALL SCALE OF CONTRACT DOCUMENTS IT IS NOT POSSIBLE TO SHOW ALL OFFSETS, TRANSITIONS, ETC. 12. THIS PROJECT SHALL INCLUDE COMMISSIONING OF THE HVAC, CONTROLS, AND RELATED ELECTRICAL SYSTEMS. 13. ALL WORK SHALL COMPLY WITH 7TH EDITION (2020) FLORIDA BUILDING CODE. 14. SEAL AND PROTECT ALL WORK IN PROGRESS DURING CONSTRUCTION... 15. REPLACE ALL OUTSIDE AIR AND RETURN AIR DAMPERS.

SEQUENCE OF OPERATION PACKAGED ROOFTOP HEAT PUMP UNIT

THE FOLLOWING SEQUENCE OF OPERATIONS SHALL BE PROVIDED BY THE UNIT MANUFACTURER. GENERAL: STARTING AND STOPPING OF EQUIPMENT SHALL BE BY THE UNIT MOUNTED CONTROLLER. OCCUPIED MODE: THE INDOOR FAN SHALL RUN CONTINUOUSLY. UNOCCUPIED MODE: THE INDOOR FAN AND CONDENSING UNIT SHALL CYCLE TO MAINTAIN SETPOINT TEMPERATURE. OVERRIDE MODE: THE OVERRIDE MODE SHALL PLACE THE SYSTEM IN OCCUPIED MODE. HUMIDITY CONTROL: WHEN TEMPERATURE AND HUMIDITY ARE NOT SATISFIED IN THE SPACE, THE UNIT SHALL ENTER SUBCOOLING MODE. UPON A RISE IN SPACE RELATIVE HUMIDITY ABOVE SETPOINT AND NO CALL FOR COOLING, THE UNIT CONTROLLER SHALL PLACE THE CONDENSING UNIT IN COOLING MODE AND UTILIZE THE HOT GAS REHEAT TO DEHUMIDIFY AND REHEAT SUPPLY AIR.

COOLING TOWER SCHEDULE-EXISTING

Table for Cooling Tower Schedule-Existing with columns: UNIT DESIGNATION, PERFORMANCE DATA, AMBIENT AIR TEMPERATURE, CONDENSER WATER FLOW, ENTERING WATER TEMPERATURE, LEAVING WATER TEMPERATURE.

CHILLER SCHEDULE-EXISTING

Table for Chiller Schedule-Existing with columns: MARK, CH-1, CH-2. Includes rows for entering/leaving water temp, chilled water flow, evaporator wpd, condenser entering/leaving water temp, condenser water flow, and condenser pressure drop.

NOTE: 1. VALUES ARE PROVIDED FOR BALANCING PURPOSES.

LEGEND

Legend section containing symbols and descriptions for equipment tags, ductwork, valves, and other HVAC components. Includes categories like TYP (TYPICAL), TYP (TEMPERATURE), and various unit symbols.

CUSTOM AIR HANDLING UNIT SCHEDULE-EXISTING

Table with columns: UNIT DESIGNATION, AIR VOLUME CONTROL, FAN DATA, CHILLED WATER COIL DATA, WATER SIDE. Lists units AHU-1 through AHU-7.

SCHEDULE LEGEND: HD - HORIZONTAL DRAW THRU, SDU - STACKED DEHUMIDIFICATION UNIT, FC - FORWARD CURVED, PF - FLENUM FAN, BC - BACKWARD CURVED. SCHEDULE NOTES: 1. VALUES ARE PROVIDED FOR BALANCING PURPOSES. 2. REFURBISH UNIT. 3. REPLACE MERV 13 12" AIR FILTERS.

FAN COIL UNIT SCHEDULE-EXISTING

Table with columns: UNIT DESIGNATION, TYPE, FAN DATA, CHILLED WATER COIL DATA, WATER SIDE. Lists unit FCU-1.

NOTE: 1. VALUES ARE FOR BALANCING PURPOSES.

PUMP SCHEDULE-EXISTING

Table with columns: DESIGNATION, CHWP-1, CHWP-2, CWP-1, CWP-2. Lists pumps for chilled water distribution and condenser water.

NOTE: 1. VALUES ARE FOR BALANCING PURPOSES.

WATFORD ENGINEERING logo and contact information: 4505 Citrus Street, Miramar, FL 33040, Phone: 954.882.2700, David N. Waller, PE, Florida License Number: 102028, Project Number: 2020-028.



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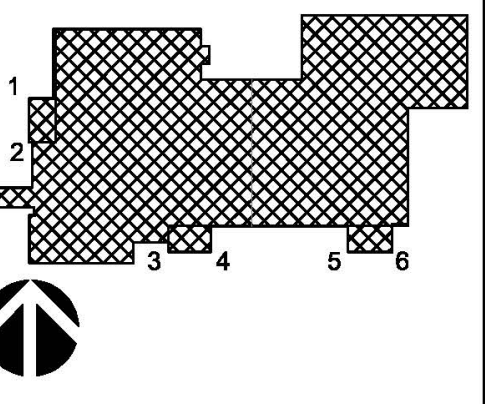


Table with 3 columns: No., Description, Date. For revisions.

HVAC SCHEDULES

Project number 17057.8 Dated 04-12-21 PIC DNW PM KAJ

M102

Scale As Indicated

INDOOR AIR QUALITY CALCULATIONS - AHU-3. Table with columns: Indoor Contaminants, Maximum Threshold Value (PPM), Steady State Using the VRP, Steady State Using the IAQ Method, Is Steady State Level Acceptable at Reduced OA Levels?

INDOOR AIR QUALITY CALCULATIONS - AHU-2. Table with columns: Indoor Contaminants, Maximum Threshold Value (PPM), Steady State Using the VRP, Steady State Using the IAQ Method, Is Steady State Level Acceptable at Reduced OA Levels?

INDOOR AIR QUALITY CALCULATIONS - AHU-1. Table with columns: Indoor Contaminants, Maximum Threshold Value (PPM), Steady State Using the VRP, Steady State Using the IAQ Method, Is Steady State Level Acceptable at Reduced OA Levels?

INDOOR AIR QUALITY CALCULATIONS - AHU-6. Table with columns: Indoor Contaminants, Maximum Threshold Value (PPM), Steady State Using the VRP, Steady State Using the IAQ Method, Is Steady State Level Acceptable at Reduced OA Levels?

INDOOR AIR QUALITY CALCULATIONS - AHU-5. Table with columns: Indoor Contaminants, Maximum Threshold Value (PPM), Steady State Using the VRP, Steady State Using the IAQ Method, Is Steady State Level Acceptable at Reduced OA Levels?

INDOOR AIR QUALITY CALCULATIONS - AHU-4. Table with columns: Indoor Contaminants, Maximum Threshold Value (PPM), Steady State Using the VRP, Steady State Using the IAQ Method, Is Steady State Level Acceptable at Reduced OA Levels?

INDOOR AIR QUALITY CALCULATIONS - AHU-7. Table with columns: Indoor Contaminants, Maximum Threshold Value (PPM), Steady State Using the VRP, Steady State Using the IAQ Method, Is Steady State Level Acceptable at Reduced OA Levels?



880.829.3647 4405 Crane Street Miramar, Florida 33146 Project CA Number: 27028 David N. Walker, PE Florida License Number: 16228 Project Number: 2020-008

SHEET NOTES

- ① REMOVE EXISTING TEMPERATURE SENSORS.
- ② REMOVE EXISTING TERMINAL UNITS AND RELATED CONTROLS.
- ③ REMOVE EXISTING ROOF MOUNTED FAN.
- ④ REMOVE EXISTING DUCT MOUNTED HEATER. PREPARE FOR REPLACEMENT WITH NEW HEATER.

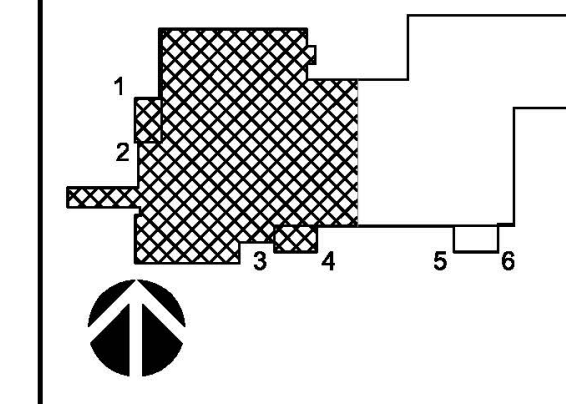
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HVAC UPGRADES & RESTROOM RENOVATIONS**
TASK ORDER NO. 8 & NO. 5 - C-18-2638-TDD
1250 MIRACLE STRIP PKWY SE
FORT WALTON BEACH, FL 32548



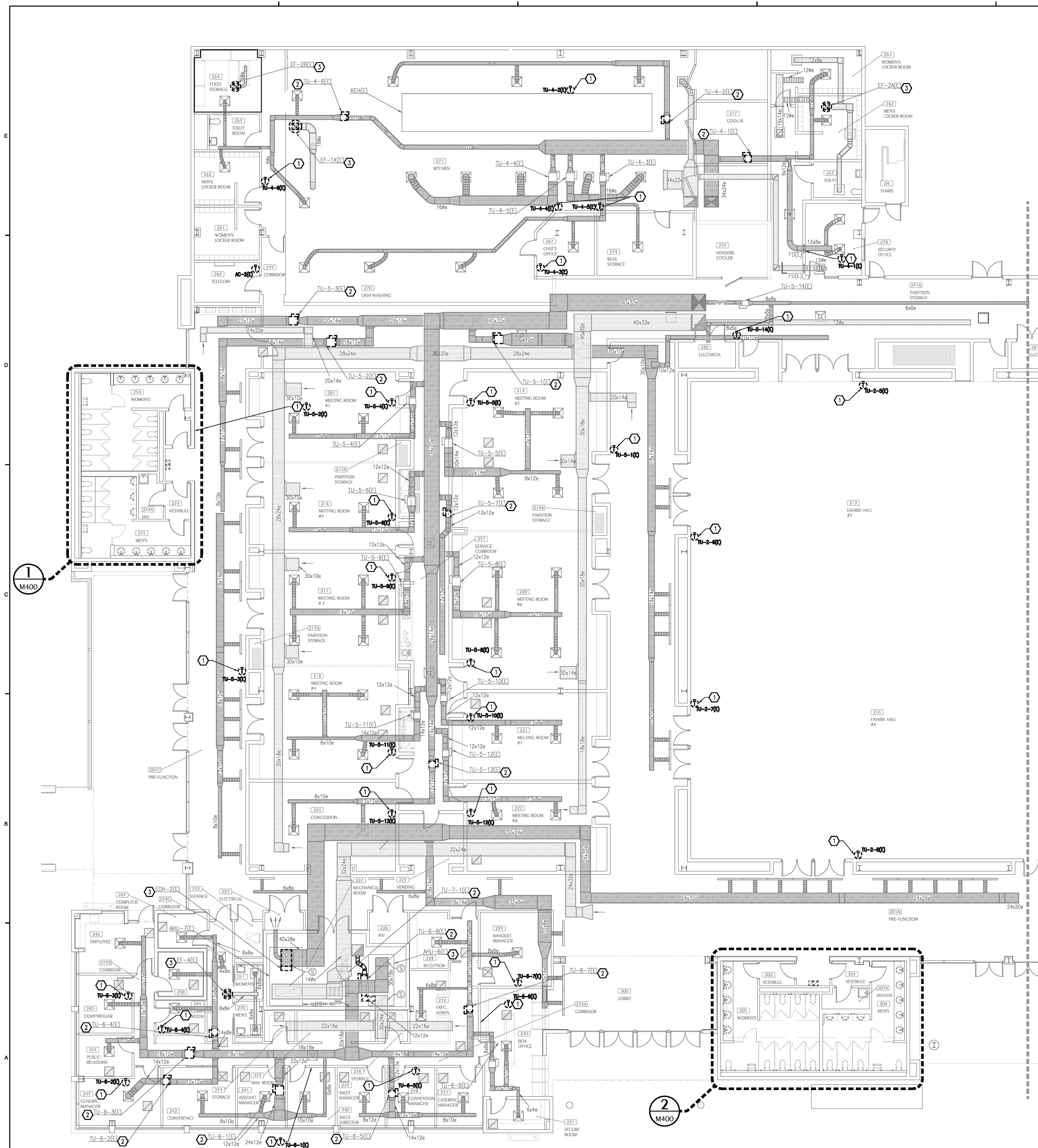
REVISIONS:

No.	Description	Date

HVAC EXHIBIT LEVEL PARTIAL DEMOLITION PLAN

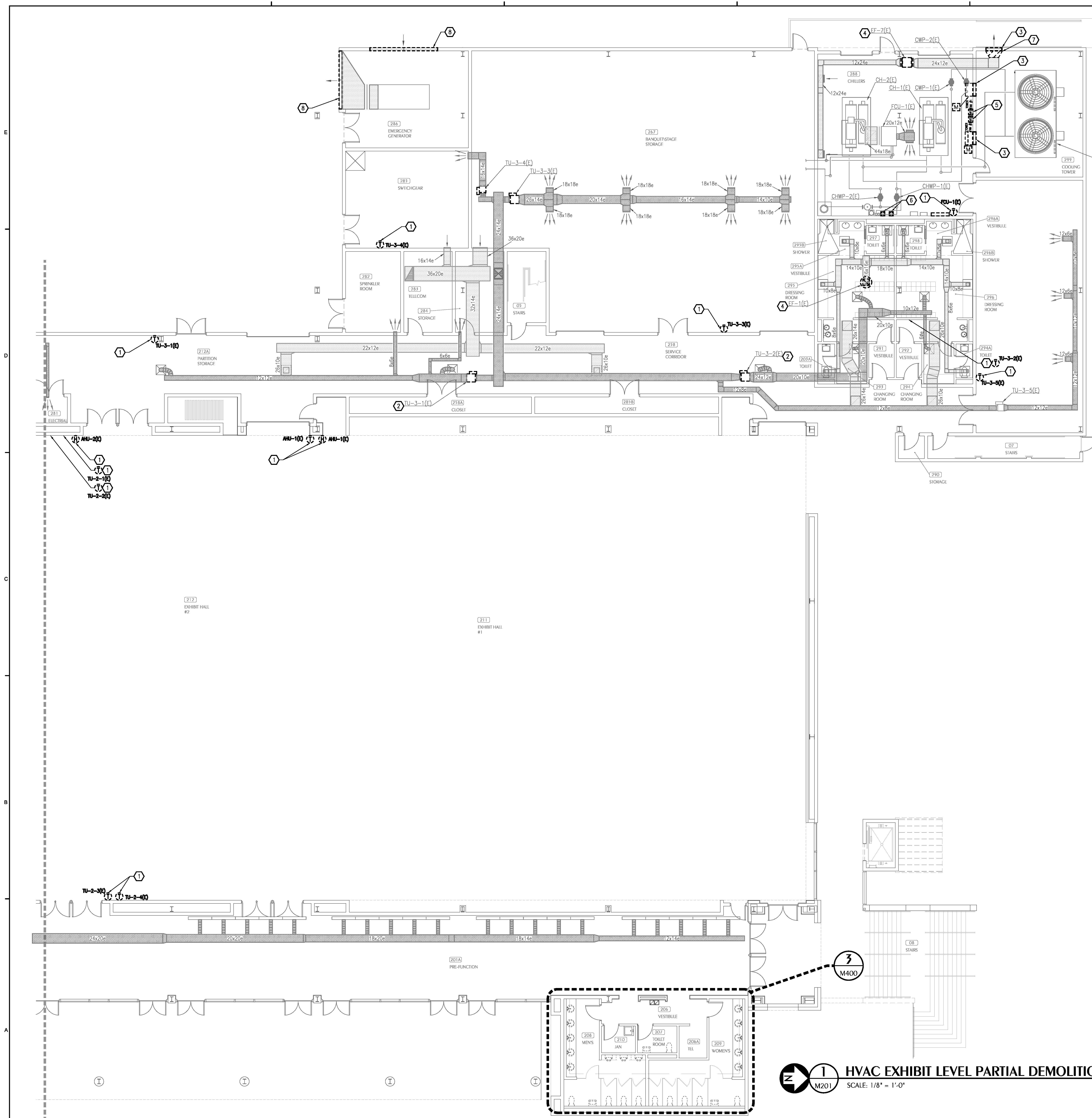
Project number: 17057.8
Dated: 04-12-21
PIC: DNW
PM: KAJ

M200
Scale: As Indicated



HVAC EXHIBIT LEVEL PARTIAL DEMOLITION PLAN
SCALE: 1/8" = 1'-0"

WATFORD ENGINEERING
850.526.3447
4405 Orange Street
Aventura, Florida 33149
PDA# CA Number: 27025
David N. Walker, PE
PDA# License Number: 64208
Project Number: 2023-038



- SHEET NOTES**
- ① REMOVE EXISTING THERMOSTAT.
 - ② REMOVE EXISTING TERMINAL UNIT AND RELATED CONTROLS.
 - ③ REMOVE EXISTING LOUVER AND MOTORIZED DAMPER. PREPARE FOR REPLACEMENT WITH NEW.
 - ④ REMOVE AND REPLACE EXISTING EQUIPMENT. REFER TO NEW WORK.
 - ⑤ REMOVE AND REPLACE EXISTING VFDs FOR COOLING TOWER.
 - ⑥ REMOVE EXISTING MOTOR STARTER FOR CHILLED WATER PUMPS.
 - ⑦ REMOVE DUCTWORK AS SHOWN.
 - ⑧ REMOVE EXISTING LOUVER. PREPARE FOR REPLACEMENT WITH NEW.

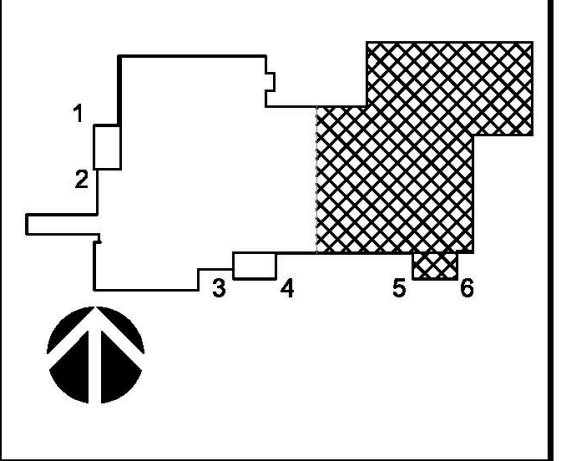


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 FORT WALTON BEACH, FL 32548



REVISIONS:

No.	Description	Date

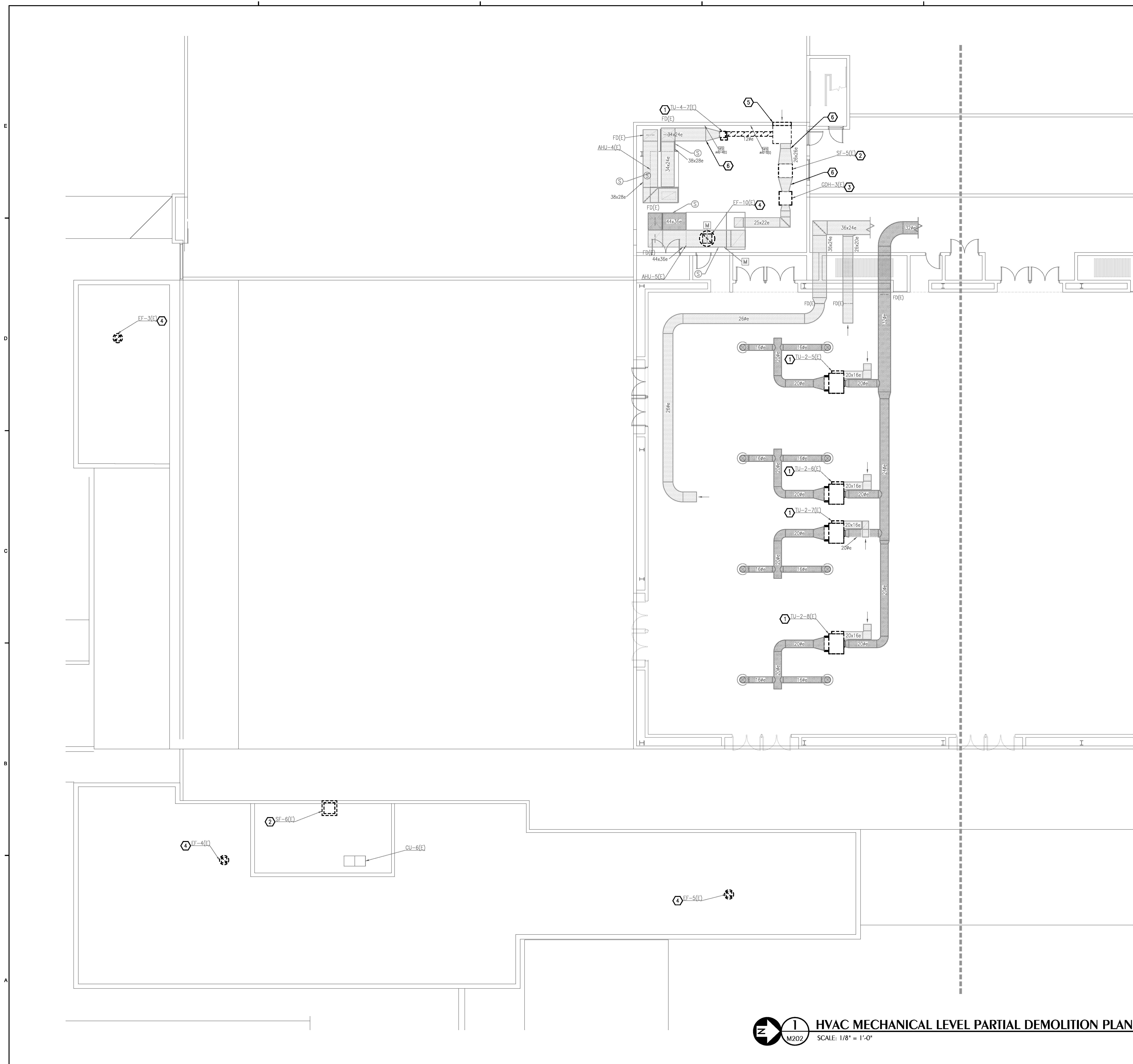
**HVAC EXHIBIT
 LEVEL PARTIAL
 DEMOLITION PLAN**

Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

M201
 Scale As Indicated

HVAC EXHIBIT LEVEL PARTIAL DEMOLITION PLAN
 SCALE: 1/8" = 1'-0"





- SHEET NOTES**
- ① REMOVE EXISTING TERMINAL UNIT.
 - ② REMOVE EXISTING SUPPLY FAN. PREPARE FOR REPLACEMENT WITH NEW SUPPLY FAN.
 - ③ REMOVE EXISTING DUCT MOUNTED HEATER. PREPARE FOR REPLACEMENT WITH NEW HEATER.
 - ④ REMOVE EXISTING EXHAUST FAN. PREPARE FOR REPLACEMENT WITH NEW EXHAUST FAN.
 - ⑤ REMOVE EXISTING LOUVER. PREPARE FOR REPLACEMENT WITH NEW LOUVER.
 - ⑥ REMOVE AND REPLACE DAMAGED INSULATION.



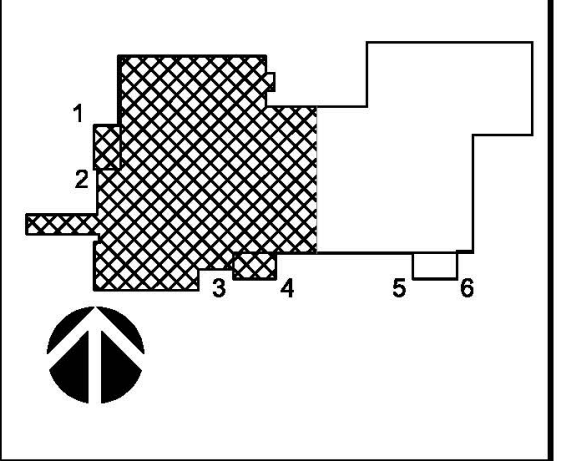
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HVAC UPGRADES & RESTROOM RENOVATIONS**

TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
1250 MIRACLE STRIP PKWY SE
FORT WALTON BEACH, FL 32548



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No.	Description	Date

**HVAC MECH.
LEVEL PARTIAL
DEMOLITION PLAN**

Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

M202

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HVAC MECHANICAL LEVEL PARTIAL DEMOLITION PLAN
SCALE: 1/8" = 1'-0"



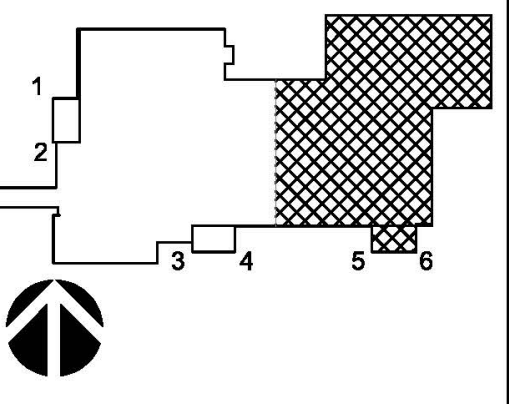


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REVISIONS:

No.	Description	Date

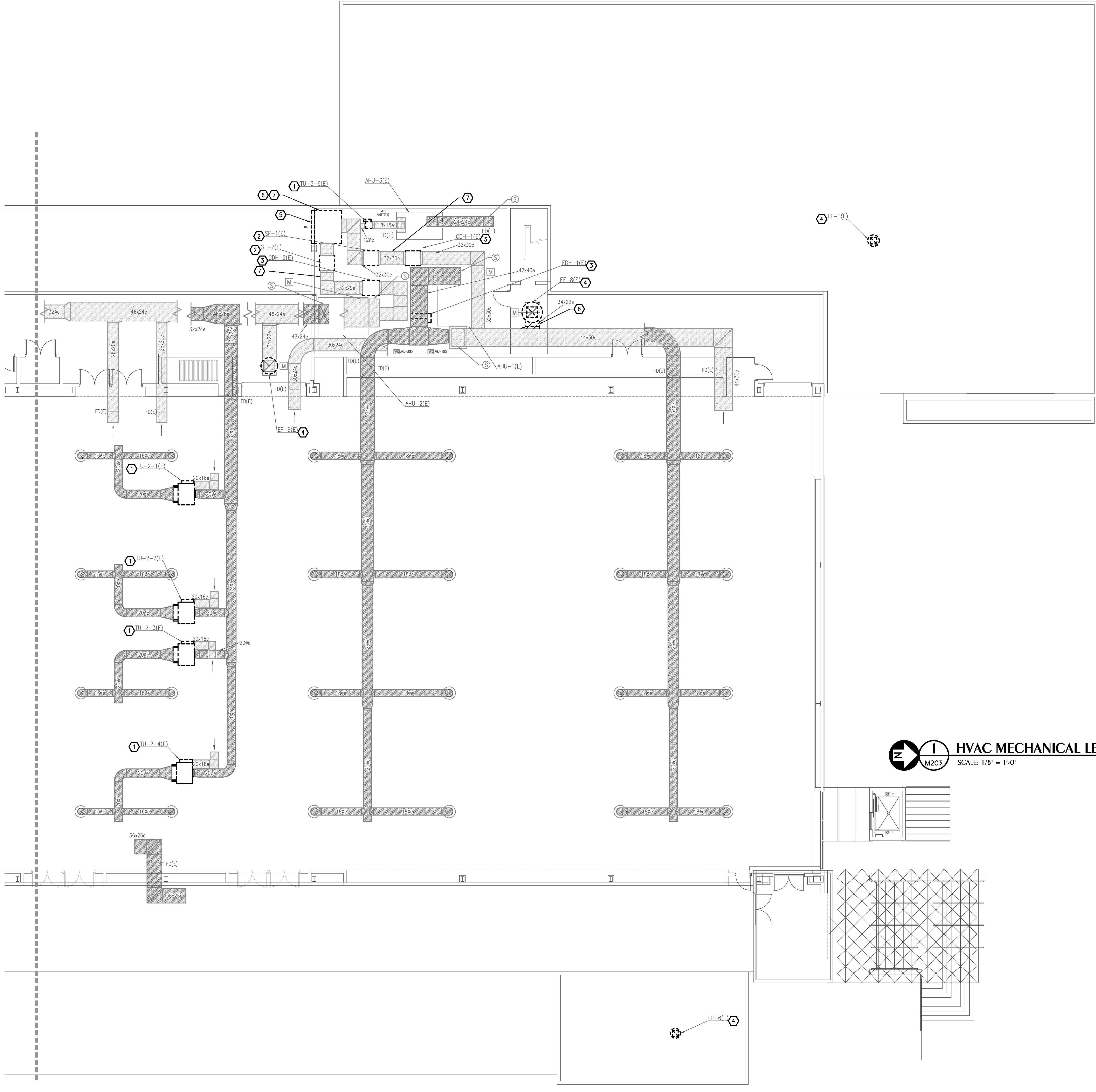
**HVAC MECH.
 LEVEL PARTIAL
 DEMOLITION PLAN**

Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

M203
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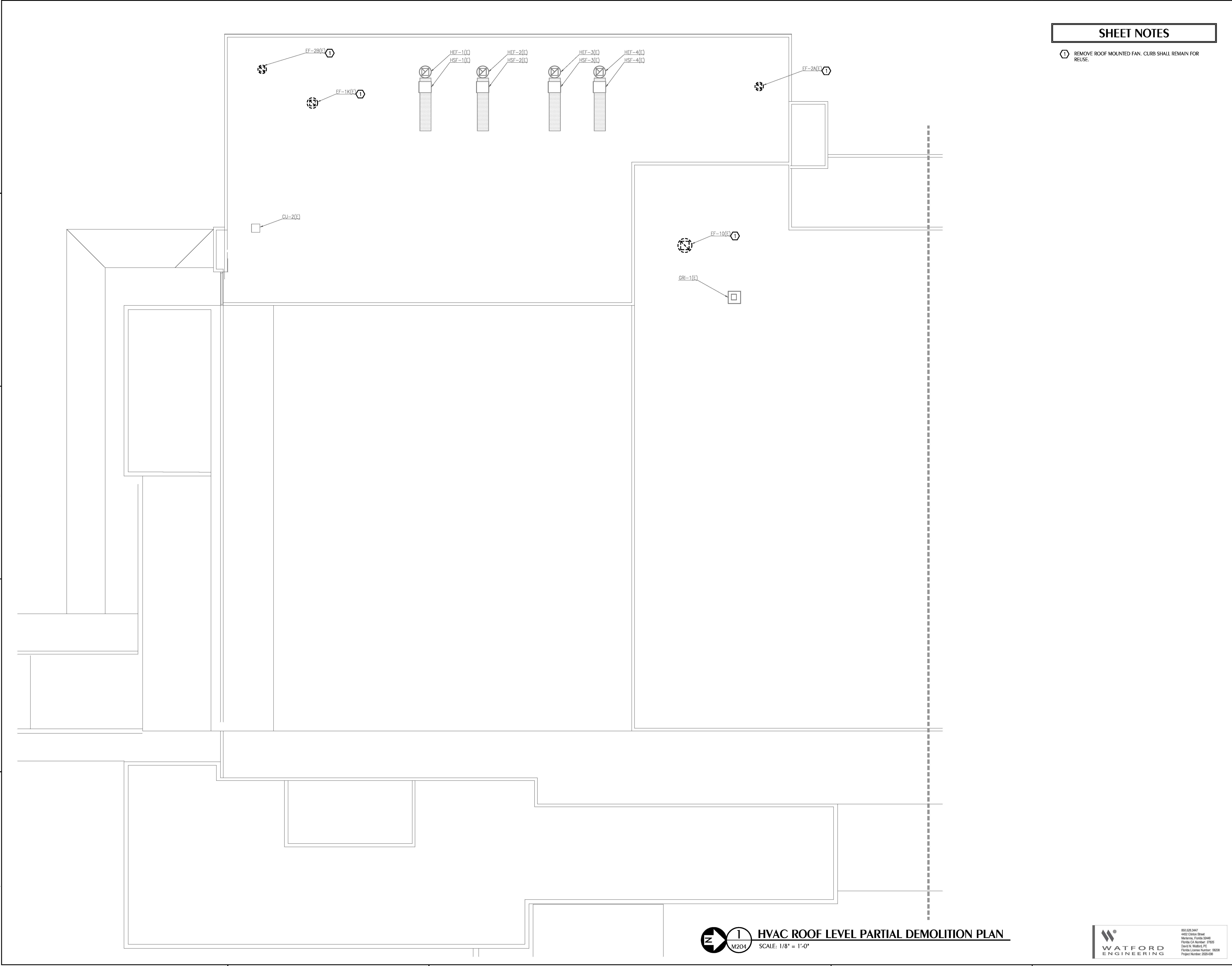
SHEET NOTES

- ① REMOVE EXISTING TERMINAL UNIT.
- ② REMOVE EXISTING SUPPLY FAN. PREPARE FOR REPLACEMENT WITH NEW SUPPLY FAN.
- ③ REMOVE EXISTING DUCT MOUNTED HEATER. PREPARE FOR REPLACEMENT WITH NEW HEATER.
- ④ REMOVE EXISTING EXHAUST FAN. PREPARE FOR REPLACEMENT WITH NEW EXHAUST FAN.
- ⑤ REMOVE EXISTING LOUVER. PREPARE FOR REPLACEMENT WITH NEW LOUVER.
- ⑥ REMOVE DAMAGED DUCTWORK AS SHOWN.
- ⑦ REMOVE DAMAGED INSULATION AS SHOWN.



HVAC MECHANICAL LEVEL PARTIAL DEMOLITION PLAN
 SCALE: 1/8" = 1'-0"





SHEET NOTES

Ⓛ REMOVE ROOF MOUNTED FAN. CURB SHALL REMAIN FOR REUSE.

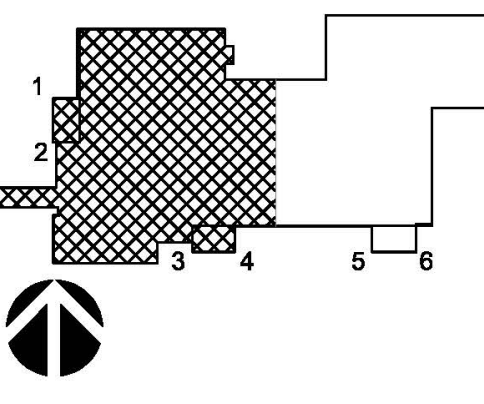


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HVAC ROOF LEVEL PARTIAL DEMOLITION PLAN

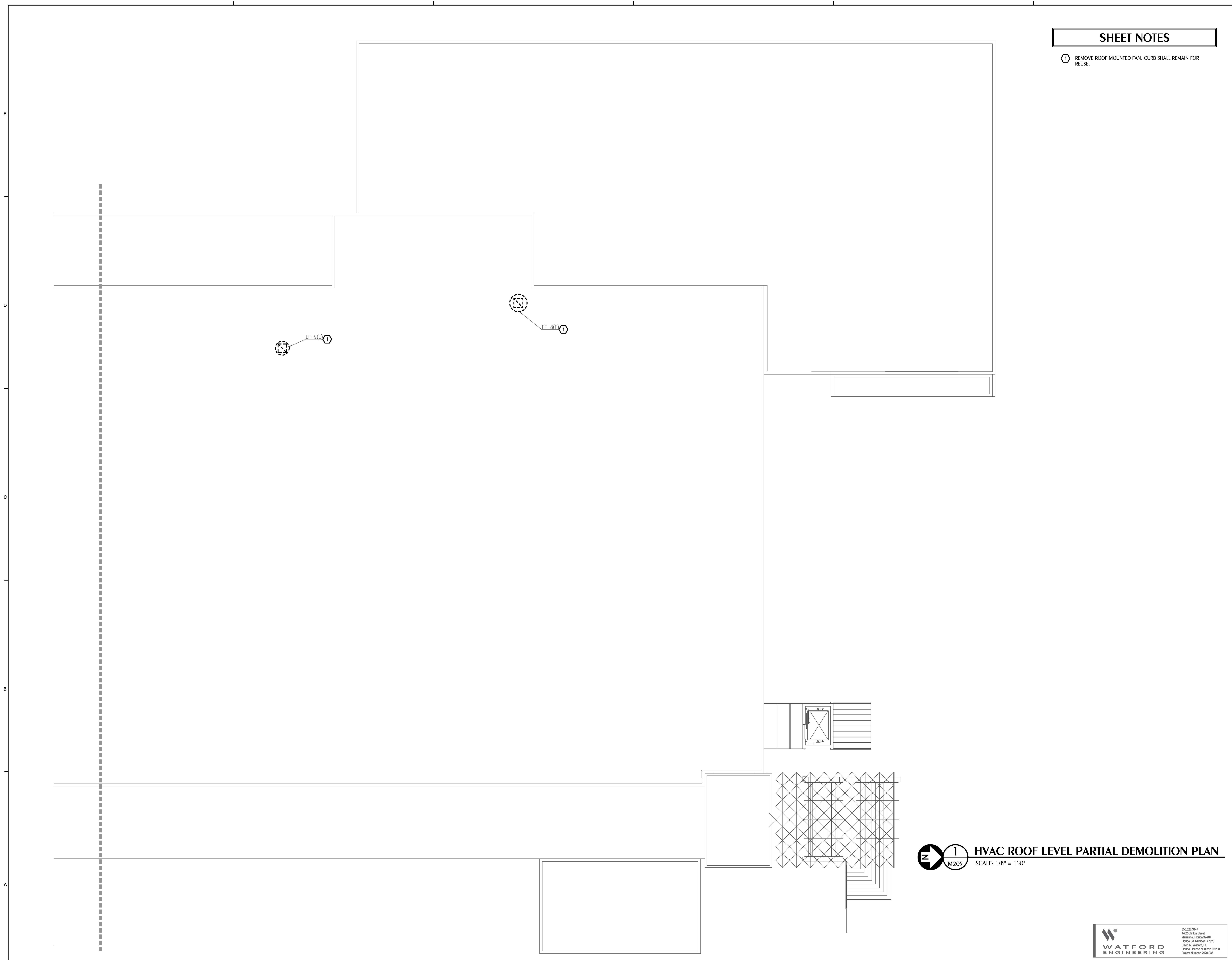
Project number	17057.8
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HVAC ROOF LEVEL PARTIAL DEMOLITION PLAN
SCALE: 1/8" = 1'-0"



850.329.3447
4450 Coker Street
Merriam, Florida 32440
Florida CA Number: 70329
David N. Walker, P.E.
Florida License Number: 16228
Project Number: 2020-008



SHEET NOTES

REMOVE ROOF MOUNTED FAN. CURB SHALL REMAIN FOR REUSE.

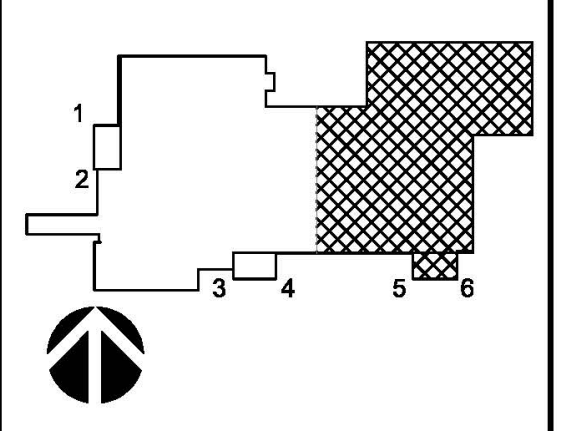


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HVAC ROOF LEVEL PARTIAL DEMOLITION PLAN

Project number	17057.8
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PIC	DNW
PM	KAJ

M205
Scale: As Indicated

HVAC ROOF LEVEL PARTIAL DEMOLITION PLAN
SCALE: 1/8" = 1'-0"



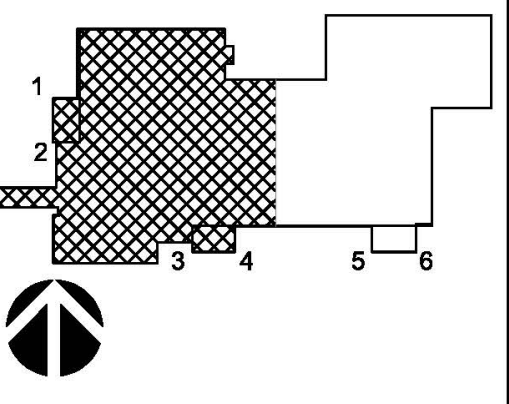


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DESTIN FORT WALTON BEACH CONVENTION CENTER
HVAC UPGRADES & RESTROOM RENOVATIONS
TASK ORDER NO. 8 & NO. 5 - C-18-2638-TDD
1250 MIRACLE STRIP PKWY SE
FORT WALTON BEACH, FL 32548



REVISIONS:

No.	Description	Date

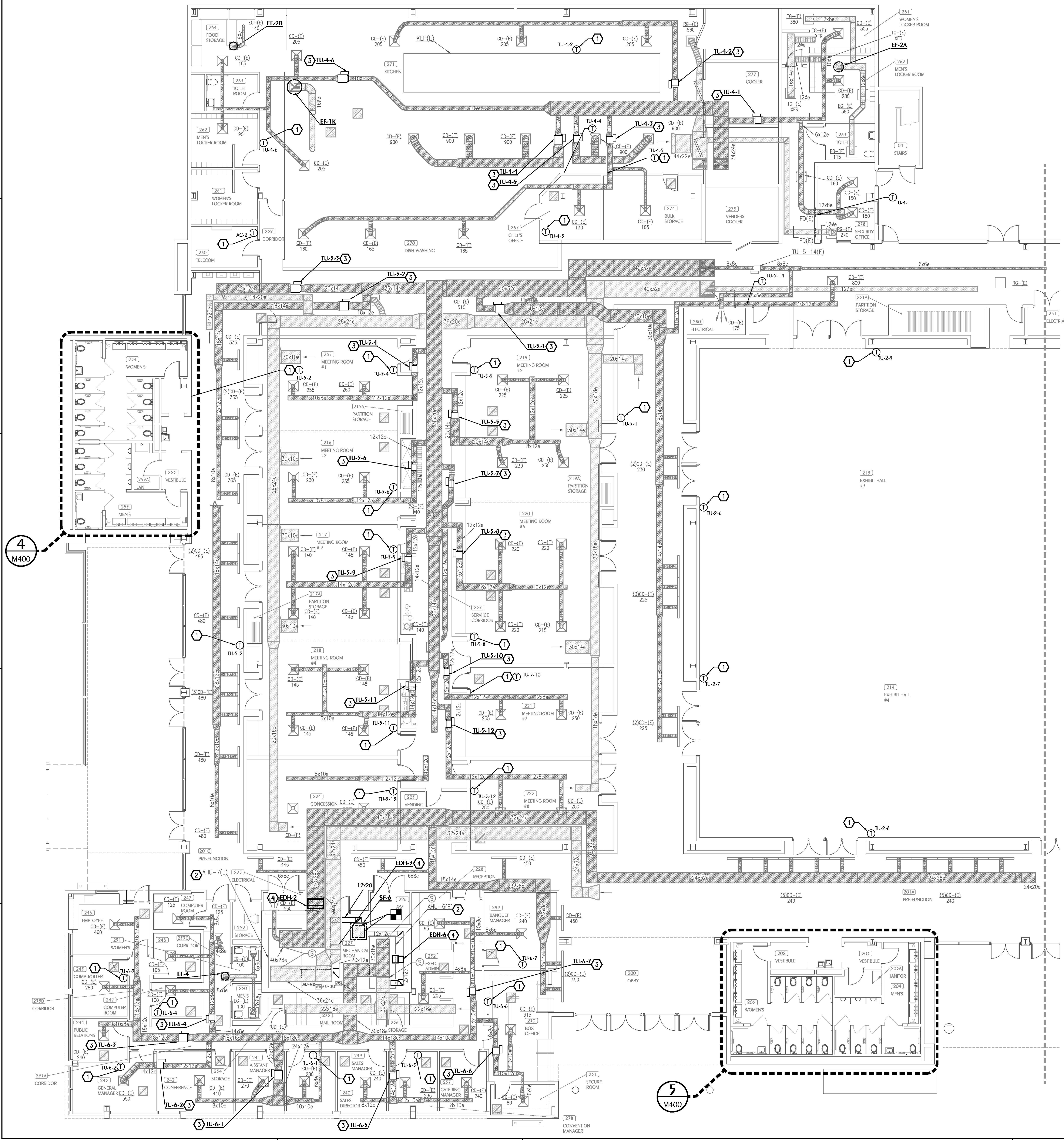
HVAC EXHIBIT LEVEL PARTIAL NEW WORK PLAN

Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

M300
Scale: As Indicated

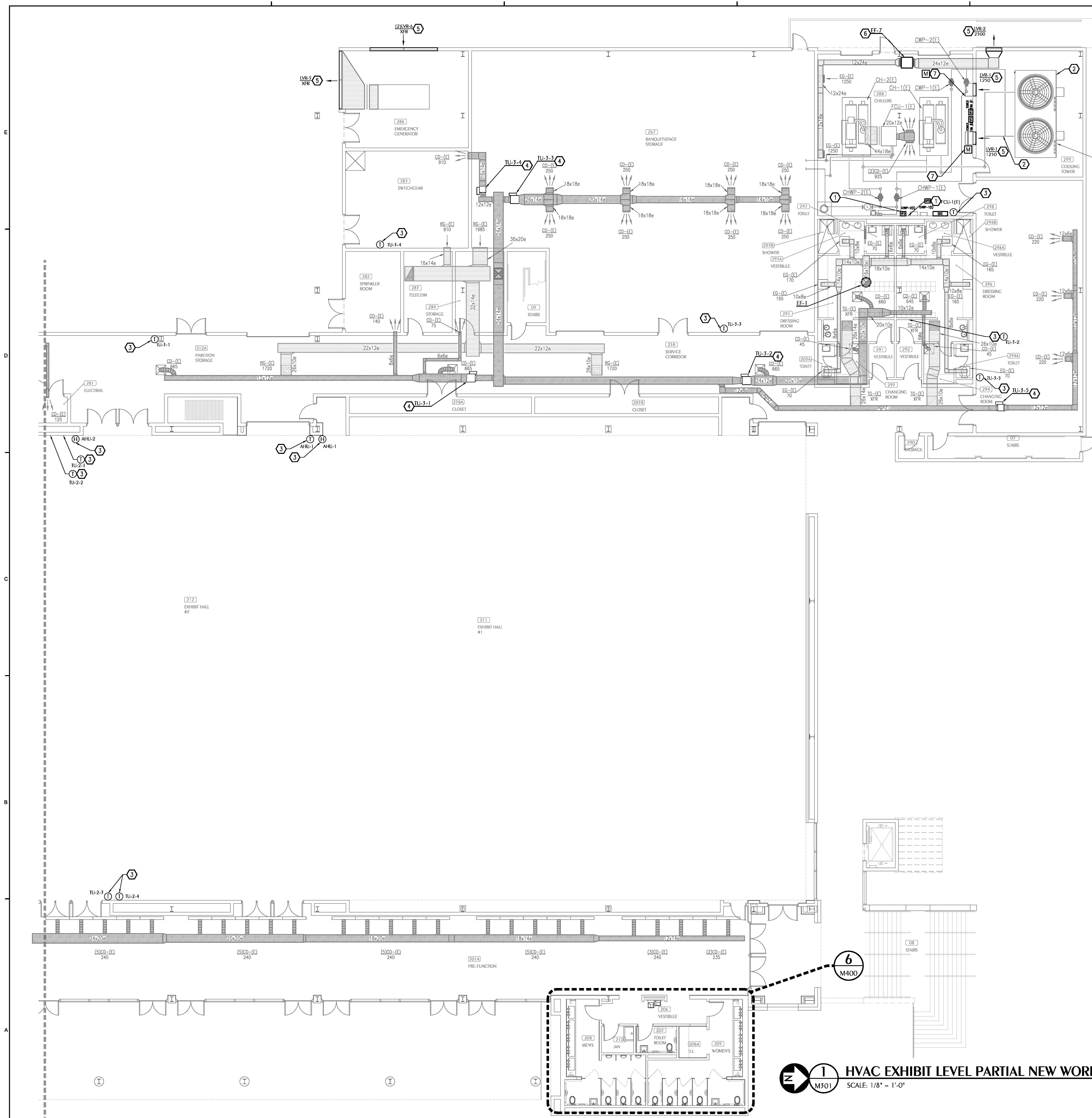
SHEET NOTES

- 1 PROVIDE NEW TEMPERATURE SENSOR.
- 2 RECONDITION INTERIOR OF EXISTING AHU TO AS-NEW CONDITION. RECONDITIONING PROCESS SHALL INCLUDE COATING OF INTERNAL UNITS, CLEANING COILS, REPLACING SPACERS BETWEEN FILTERS AND REFRUBISHING BELT DRIVE SYSTEM.
- 3 PROVIDE NEW TERMINAL UNIT. TRANSITION AS REQUIRED TO MAKE CONNECTIONS.
- 4 PROVIDE NEW ELECTRIC DUCT HEATER. FIELD VERIFY EXISTING DUCT SIZE.



1 HVAC EXHIBIT LEVEL PARTIAL NEW WORK PLAN
SCALE: 1/8" = 1'-0"

WATFORD ENGINEERING
850.528.3647
4405 Crown Street
Miramar, Florida 32549
PDA/CAD Number: 27025
DAG/FL Number: 64208
Project Number: 2023-038



- SHEET NOTES**
- 1 PROVIDE NEW VFD FOR CHILLED WATER PUMPS.
 - 2 THOROUGHLY CLEAN, PREPARE, AND PAINT ALL EXPOSED PVC PIPING AND EQUIPMENT SUPPORT WITH UV RESISTANT PAINT.
 - 3 PROVIDE NEW TEMPERATURE SENSOR.
 - 4 PROVIDE NEW TERMINAL UNIT, TRANSITION AS REQUIRED TO MAKE CONNECTIONS.
 - 5 PROVIDE NEW LOUVER IN EXISTING OPENING SIZE.
 - 6 PROVIDE NEW INLINE EXHAUST, TRANSITION DUCT AS REQUIRED TO MAKE CONNECTION TO FAN.
 - 7 PROVIDE NEW MOTORIZED DAMPERS.

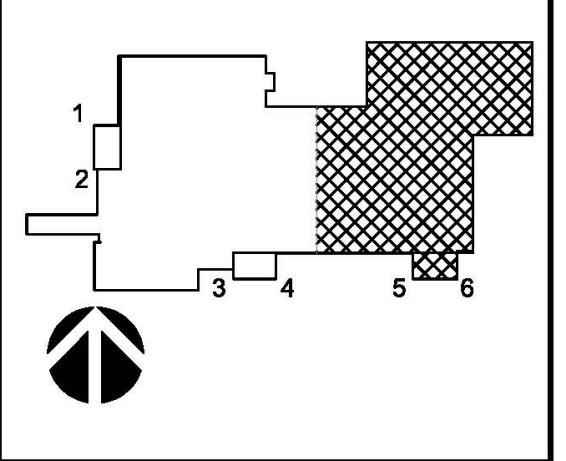


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HVAC UPGRADES & RESTROOM RENOVATIONS**
TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
1250 MIRACLE STRIP PKWY SE
FORT WALTON BEACH, FL 32548



REVISIONS:

No.	Description	Date

HVAC EXHIBIT LEVEL PARTIAL NEW WORK PLAN

Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

M301
Scale: As Indicated

1 HVAC EXHIBIT LEVEL PARTIAL NEW WORK PLAN
SCALE: 1/8" = 1'-0"



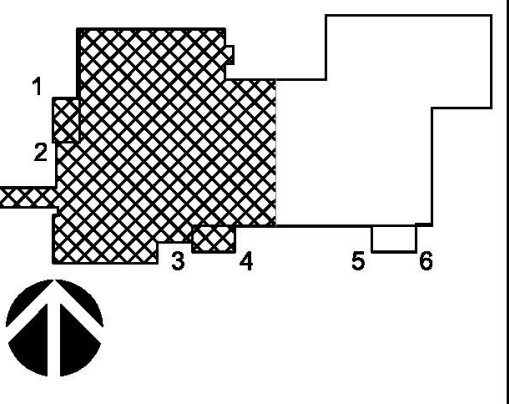


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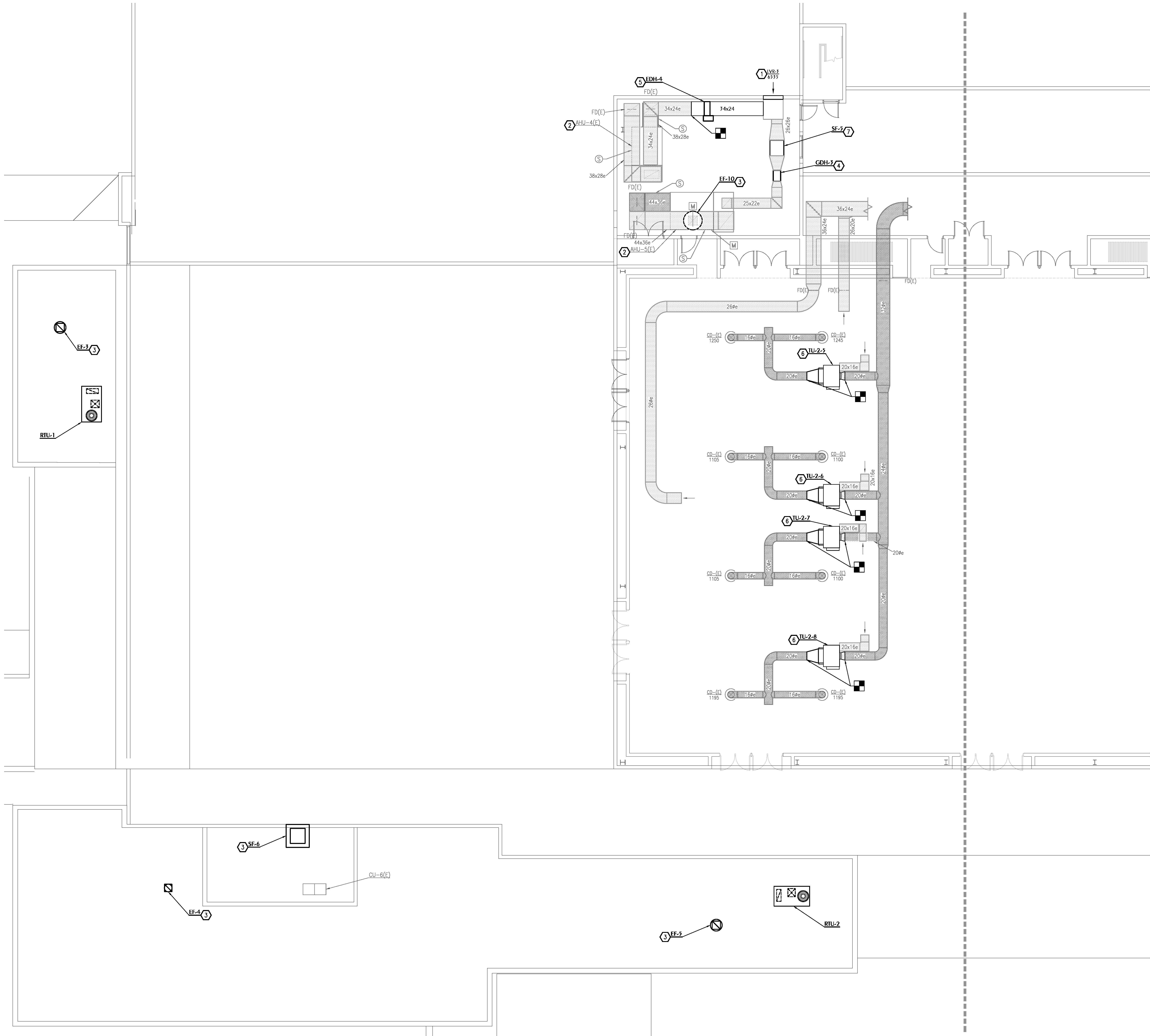
HVAC MECH.
LEVEL PARTIAL
NEW WORK PLAN

Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

M302
Scale As Indicated

SHEET NOTES

- ① PROVIDE NEW LOUVER. FIELD VERIFY EXISTING WALL OPENING.
- ② RECONDITION EXISTING AHU TO AS-NEW CONDITION. RECONDITIONING PROCESS SHALL INCLUDE COATING INTERIOR OF UNITS, CLEANING COILS, REPLACING SEALS BETWEEN FILTERS AND RECONDITIONING BELT/DRIVE SYSTEM.
- ③ PROVIDE NEW FAN. INSTALL ON EXISTING CURB. PROVIDE CURB ADAPTER AS NECESSARY.
- ④ PROVIDE NEW GAS DUCT HEATER. RECONNECT TO EXISTING DUCTWORK AND GAS PIPING. ROUTE COMBUSTION AIR INTAKE AND FLUE EXHAUST TO EXISTING PENETRATION.
- ⑤ PROVIDE NEW ELECTRIC DUCT HEATER. FIELD VERIFY EXISTING DUCT SIZE.
- ⑥ PROVIDE NEW TERMINAL UNIT. TRANSITION DUCT AS REQUIRED TO MAKE CONNECTION.
- ⑦ PROVIDE NEW FAN. TRANSITION DUCT AS REQUIRED TO MAKE CONNECTION.



HVAC MECHANICAL LEVEL PARTIAL NEW WORK PLAN
SCALE: 1/8" = 1'-0"



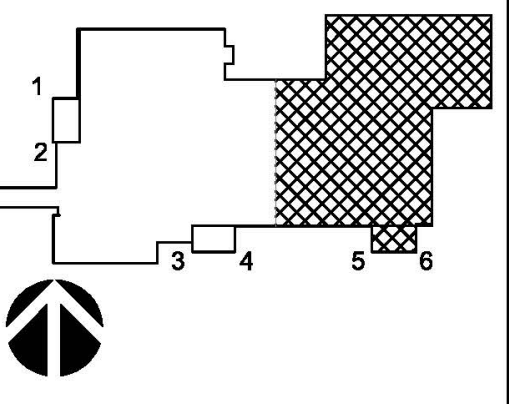


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 1250 MIRACLE STRIP PKWY SE
 FORT WALTON BEACH, FL 32548



REVISIONS:

No.	Description	Date

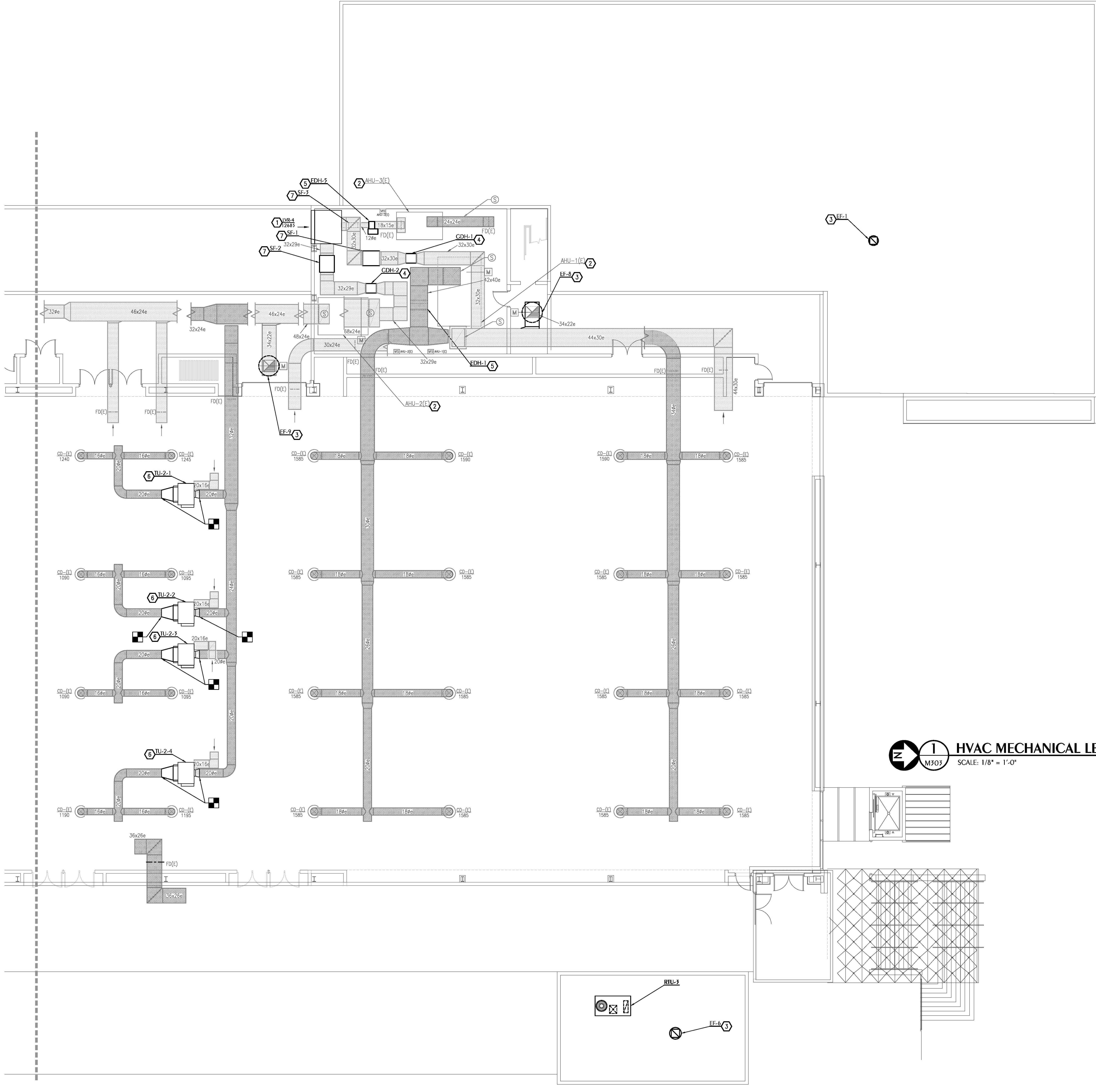
**HVAC MECH.
 LEVEL PARTIAL
 NEW WORK PLAN**

Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

M303
 Scale As Indicated

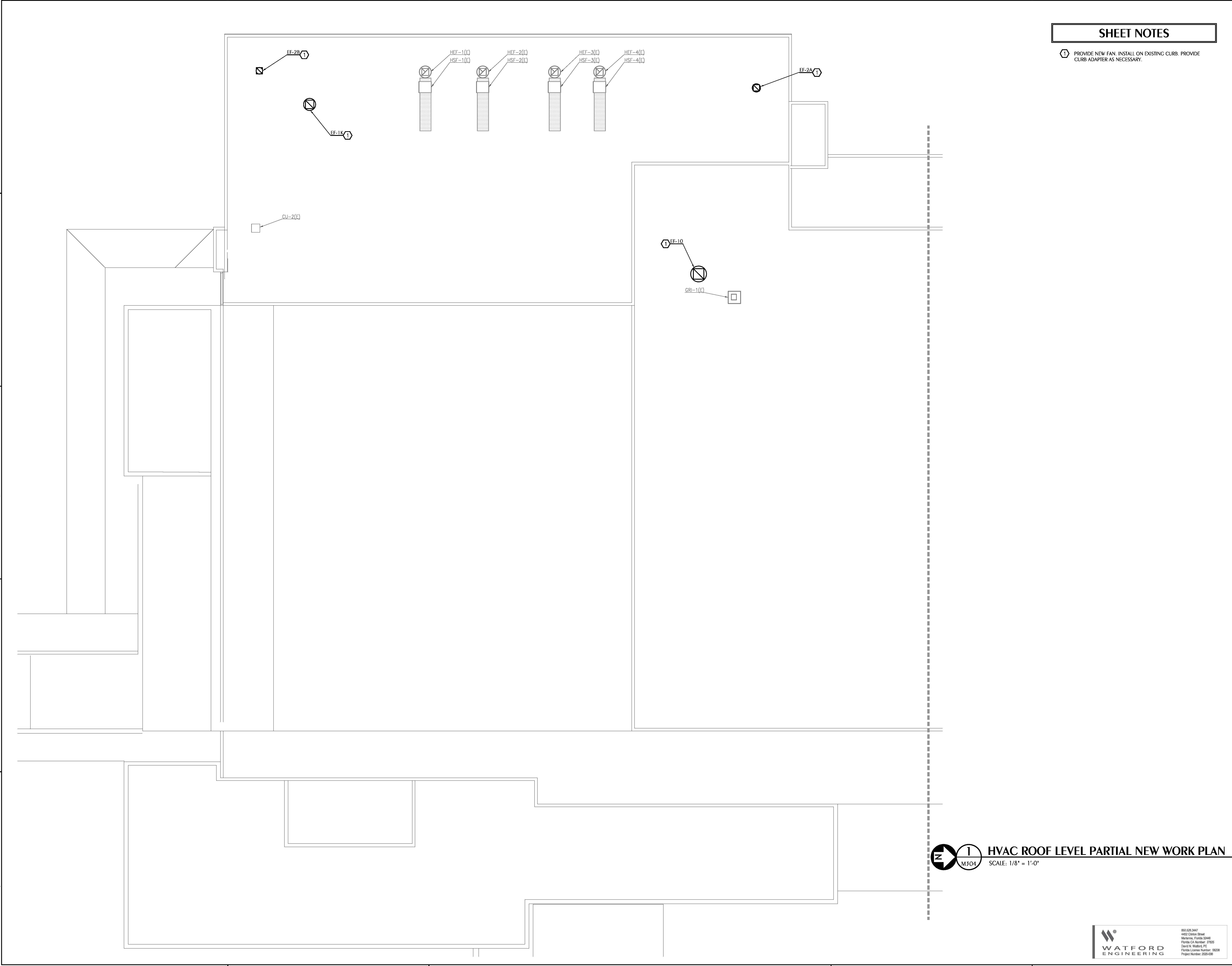
SHEET NOTES

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- ④ PROVIDE NEW GAS DUCT HEATER. RECONNECT TO EXISTING DUCTWORK AND GAS PIPING. ROUTE COMBUSTION AIR INTAKE AND FLUE EXHAUST TO EXISTING PENETRATION.
- ⑤ PROVIDE NEW DUCT HEATER. FIELD VERIFY DUCT SIZE.
- ⑥ PROVIDE NEW TERMINAL UNIT. TRANSITION AS REQUIRED TO MAKE CONNECTION.
- ⑦ PROVIDE NEW FAN. TRANSITION AS REQUIRED TO MAKE CONNECTION.



HVAC MECHANICAL LEVEL PARTIAL NEW WORK PLAN
 SCALE: 1/8" = 1'-0"





SHEET NOTES

⬠ PROVIDE NEW FAN. INSTALL ON EXISTING CURB. PROVIDE CURB ADAPTER AS NECESSARY.

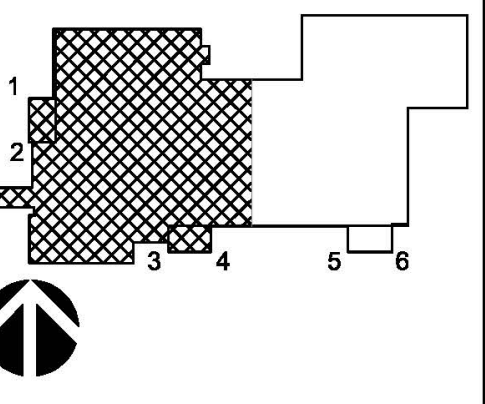


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TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
1250 MIRACLE STRIP PKWY SE
FORT WALTON BEACH, FL 32548



HVAC ROOF LEVEL PARTIAL NEW WORK PLAN
SCALE: 1/8" = 1'-0"

REVISIONS:

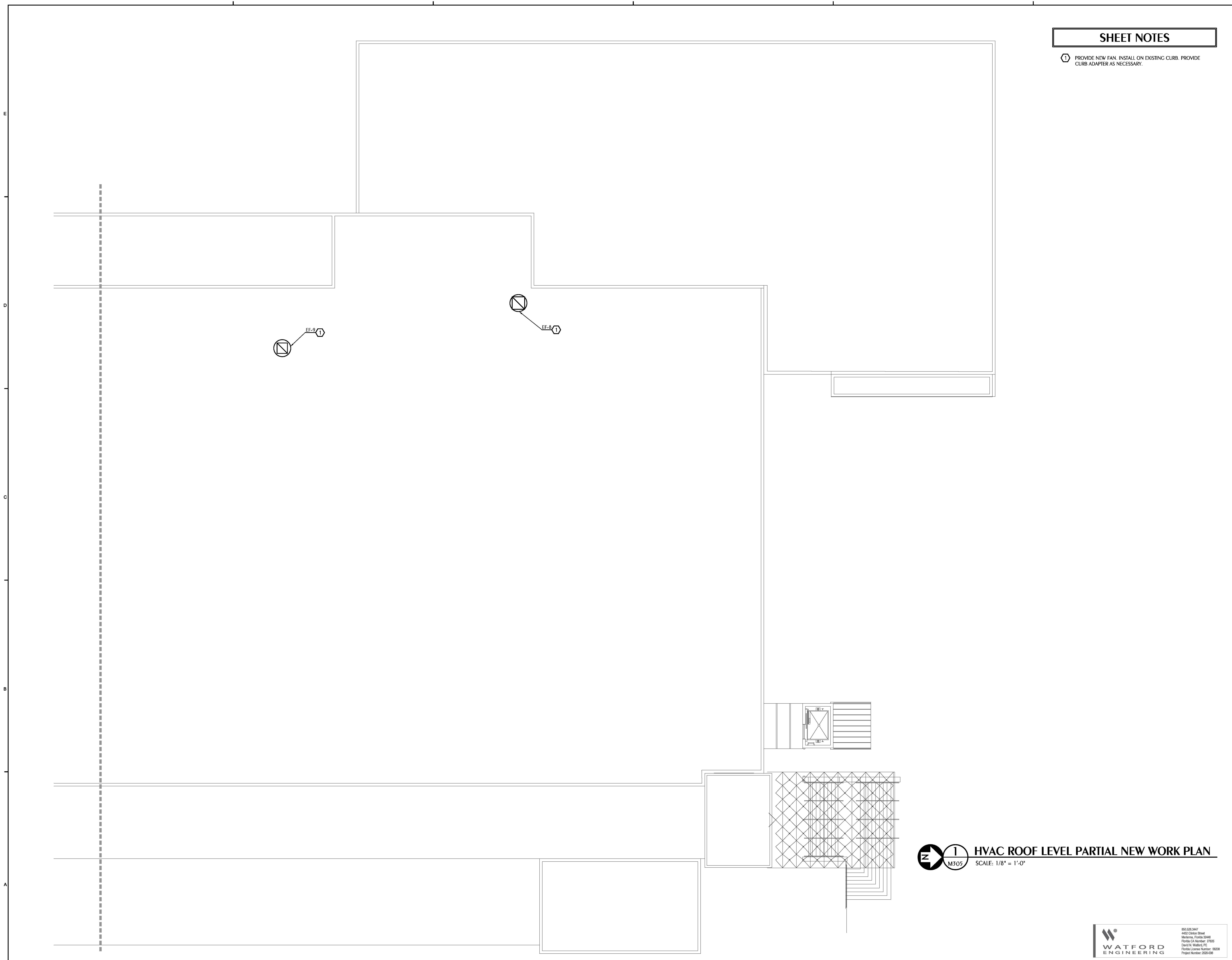
No.	Description	Date

HVAC ROOF LEVEL NEW WORK PLAN

Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

M304
Scale As Indicated





SHEET NOTES

⬠ PROVIDE NEW FAN. INSTALL ON EXISTING CURB. PROVIDE CURB ADAPTER AS NECESSARY.

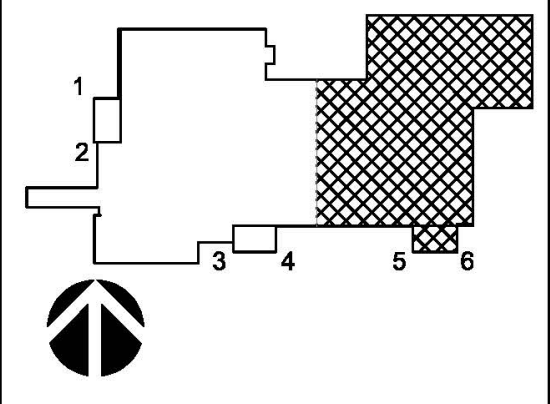


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REVISIONS:

No.	Description	Date

HVAC ROOF LEVEL NEW WORK PLAN

Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

M305
Scale As Indicated

1 HVAC ROOF LEVEL PARTIAL NEW WORK PLAN
SCALE: 1/8" = 1'-0"



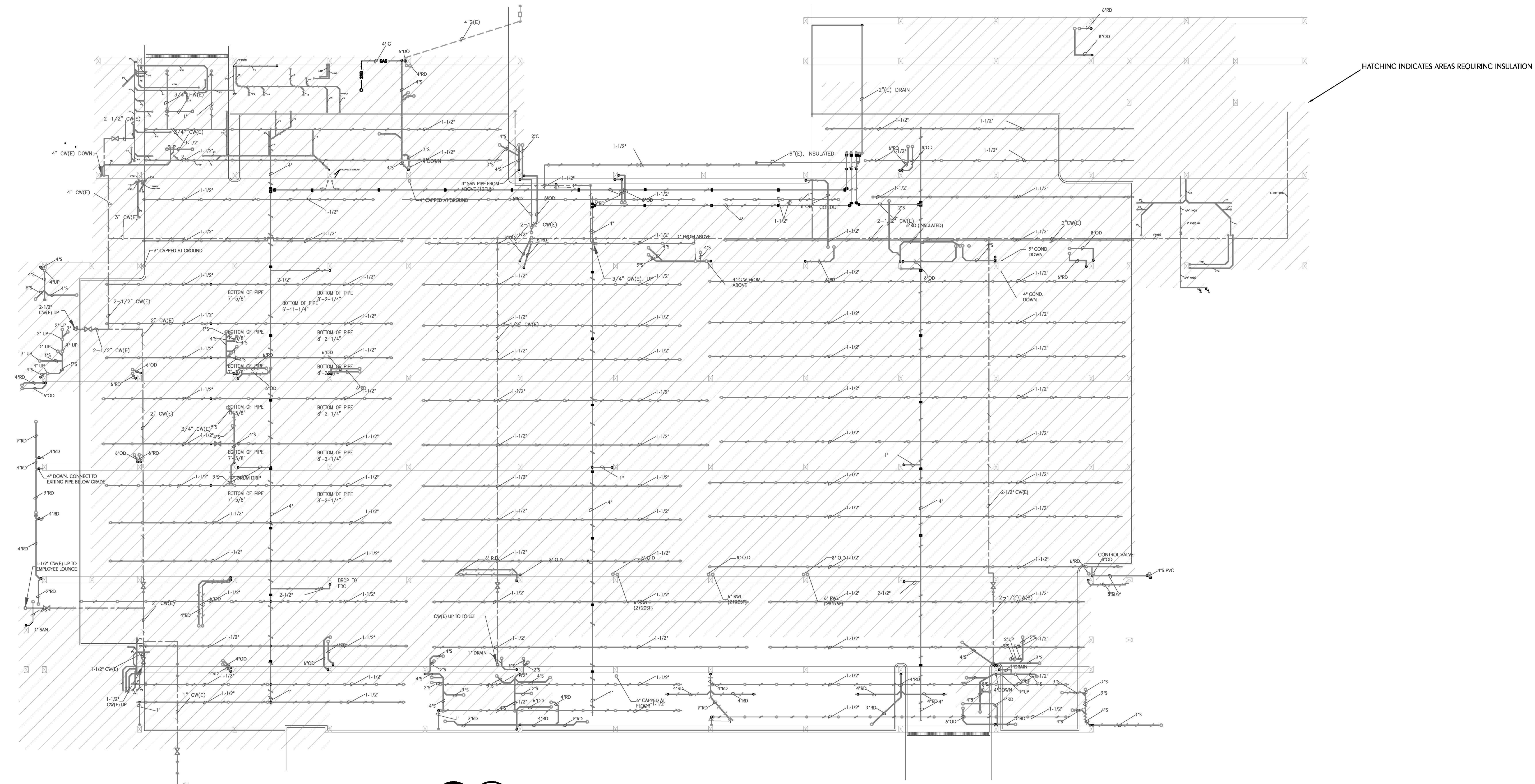
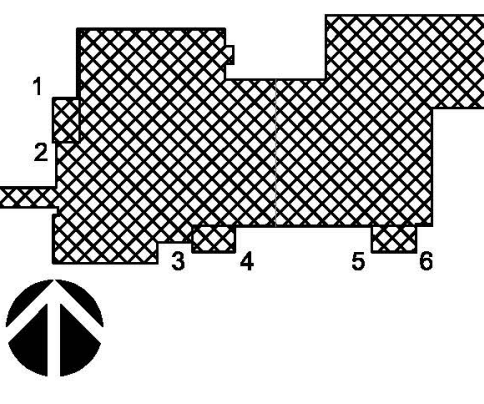


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 FORT WALTON BEACH, FL 32548



PARKING GARAGE OVERHEAD PLAN
 SCALE: 1/16" = 1'-0"

REVISIONS:

No.	Description	Date

**GARAGE
 CEILING PLAN**

Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

M306
 Scale As Indicated



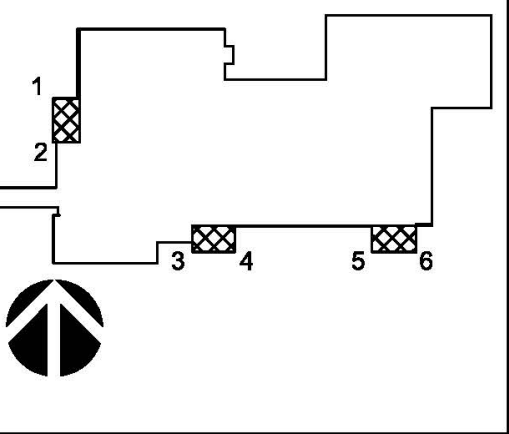


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FORT WALTON BEACH, FL 32548



REVISIONS:

No.	Description	Date

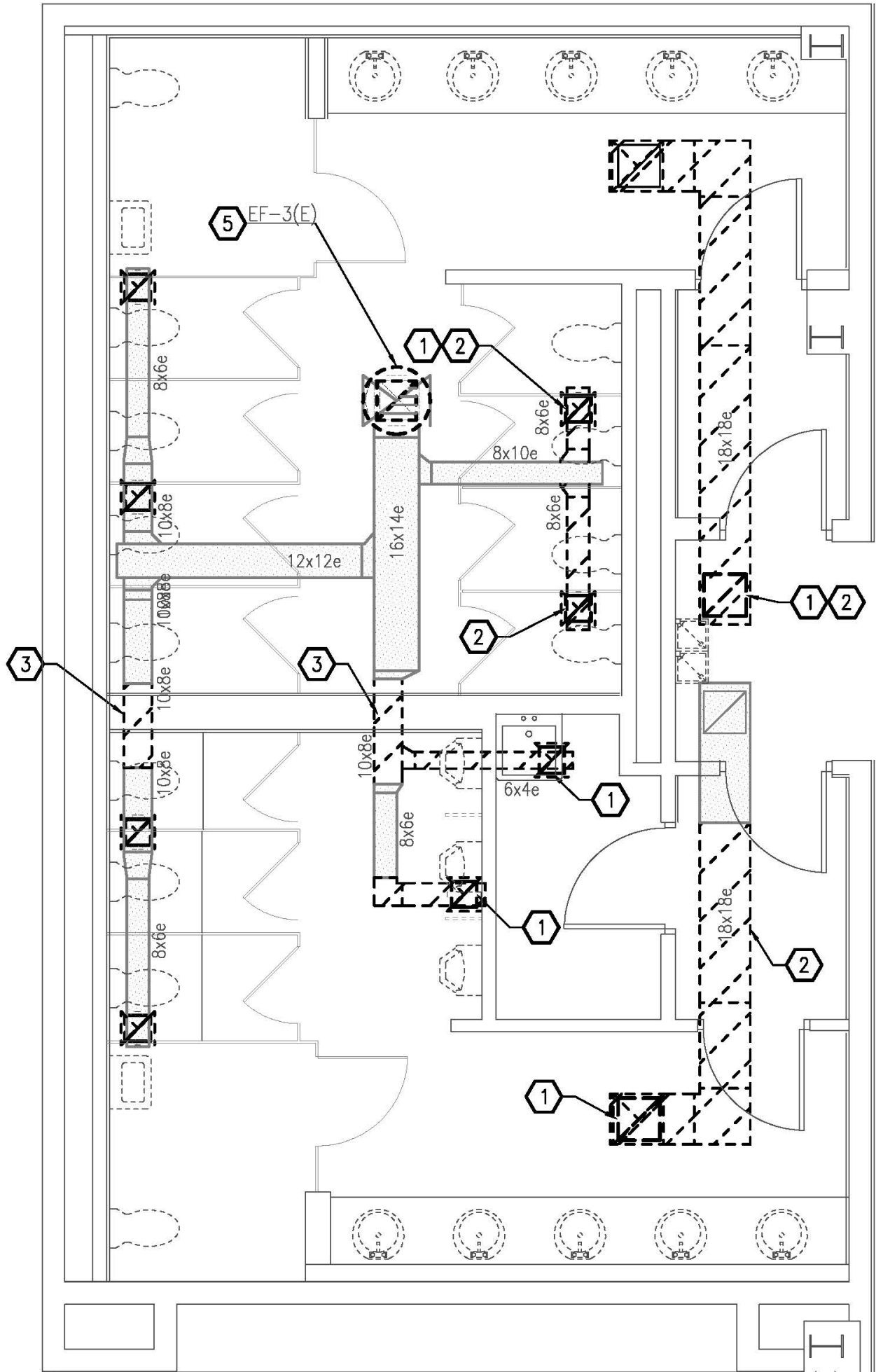
ENLARGED
HVAC PLAN

Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

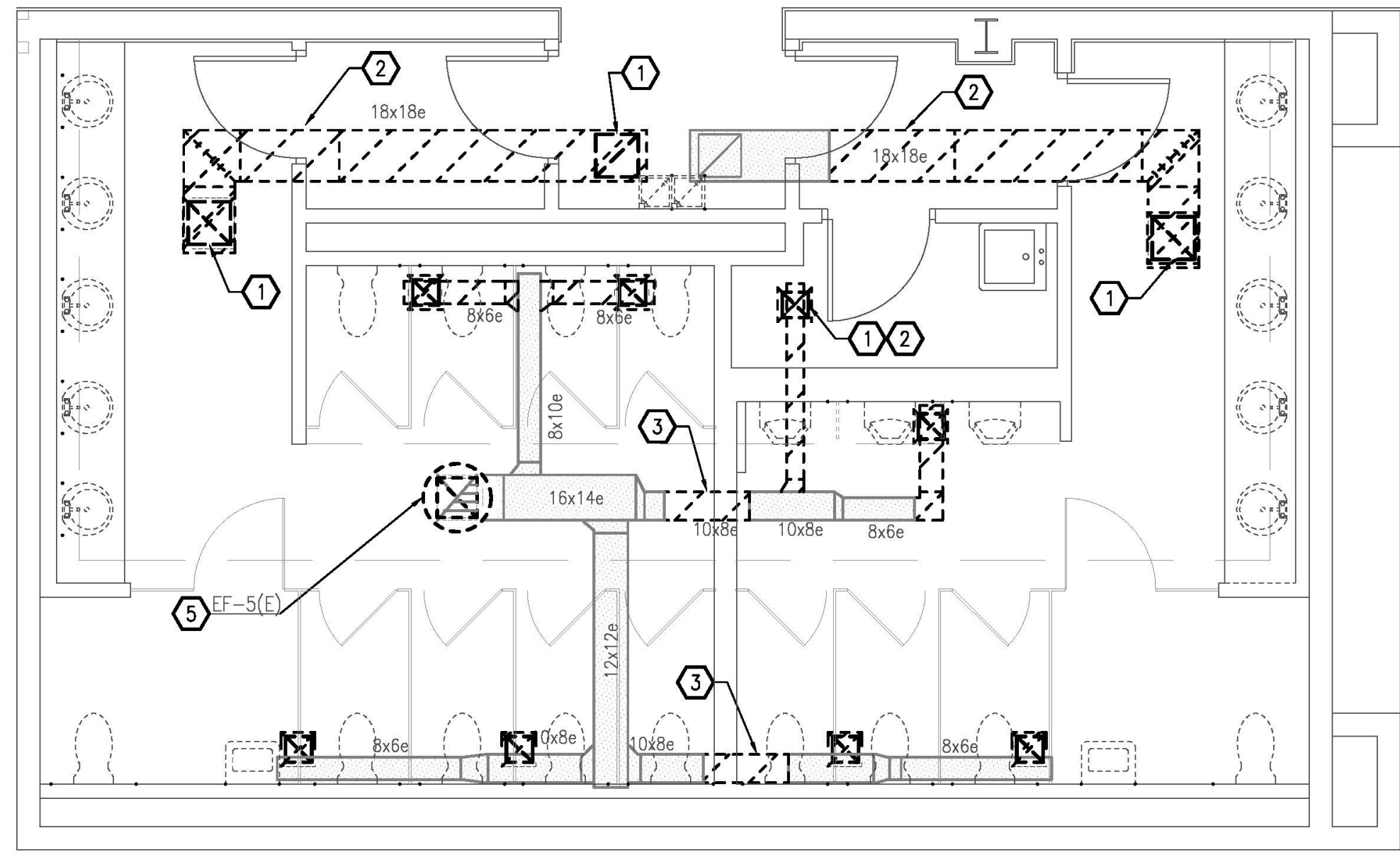
M400
Scale As Indicated

SHEET NOTES

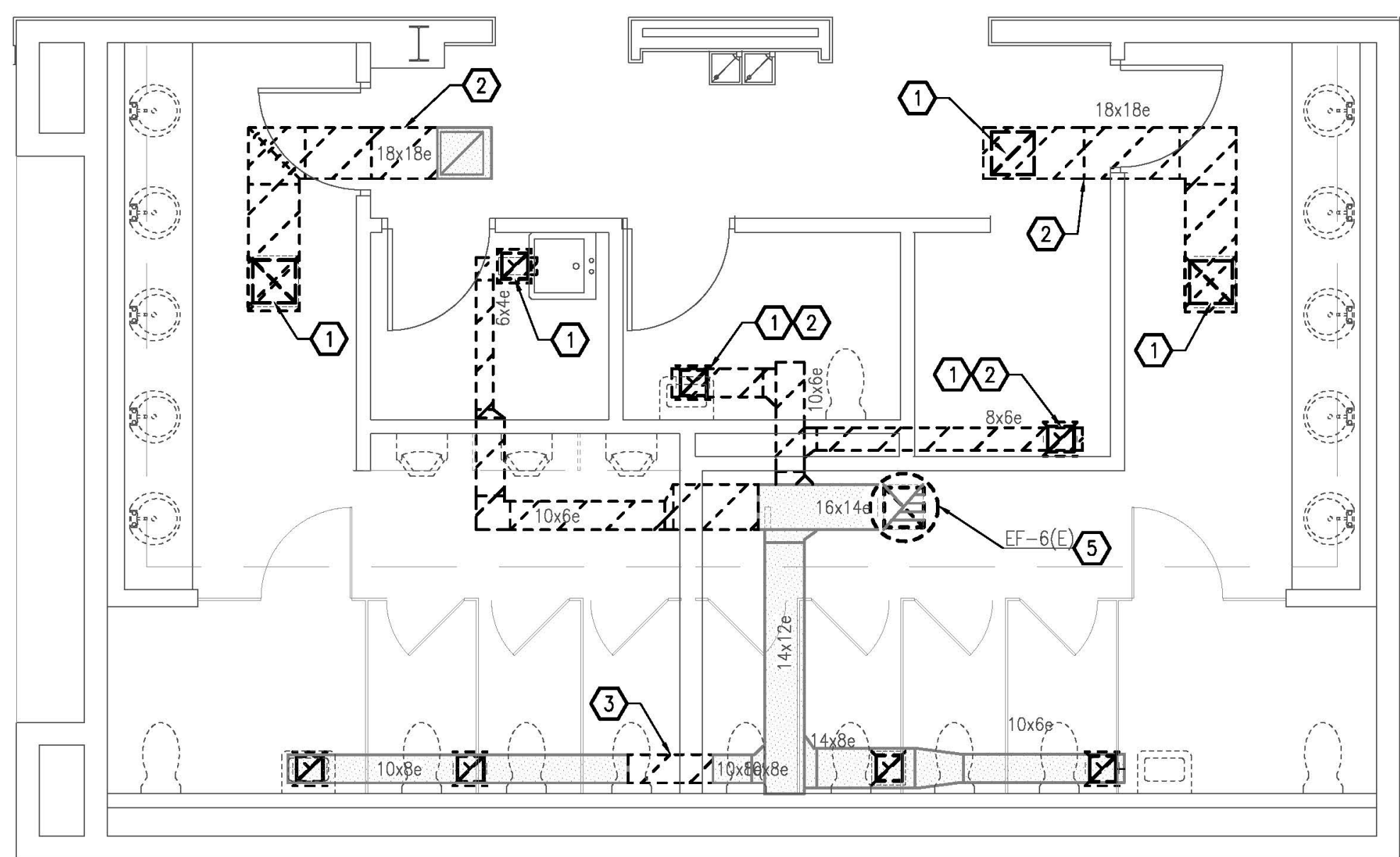
- 1 REMOVE EXISTING AIR DEVICE. TYPICAL.
- 2 REMOVE SECTION OF DUCTWORK AS SHOWN.
- 3 REMOVE PORTION OF EXISTING DUCTWORK FOR INSTALLATION OF NEW FIRE DAMPER.
- 4 PROVIDE 2'-0"x2'-0" ACCESS DOOR IN CEILING TO ALLOW ACCESS TO FIRE DAMPER.
- 5 REMOVE EXISTING ROOF MOUNTED FAN.



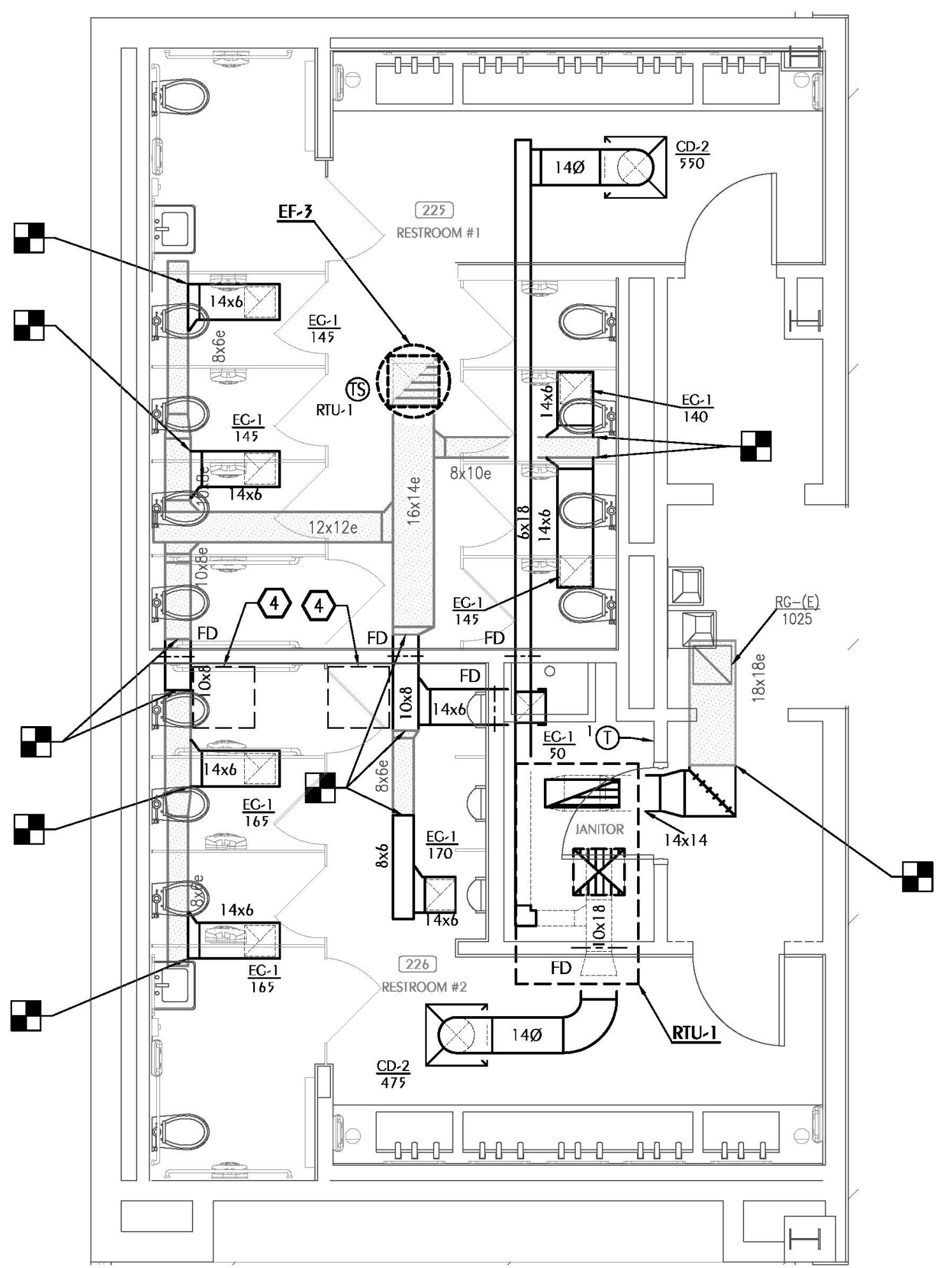
1 RESTROOM 1 & 2 MECHANICAL DEMOLITION PLAN
SCALE: 1/4" = 1'-0"



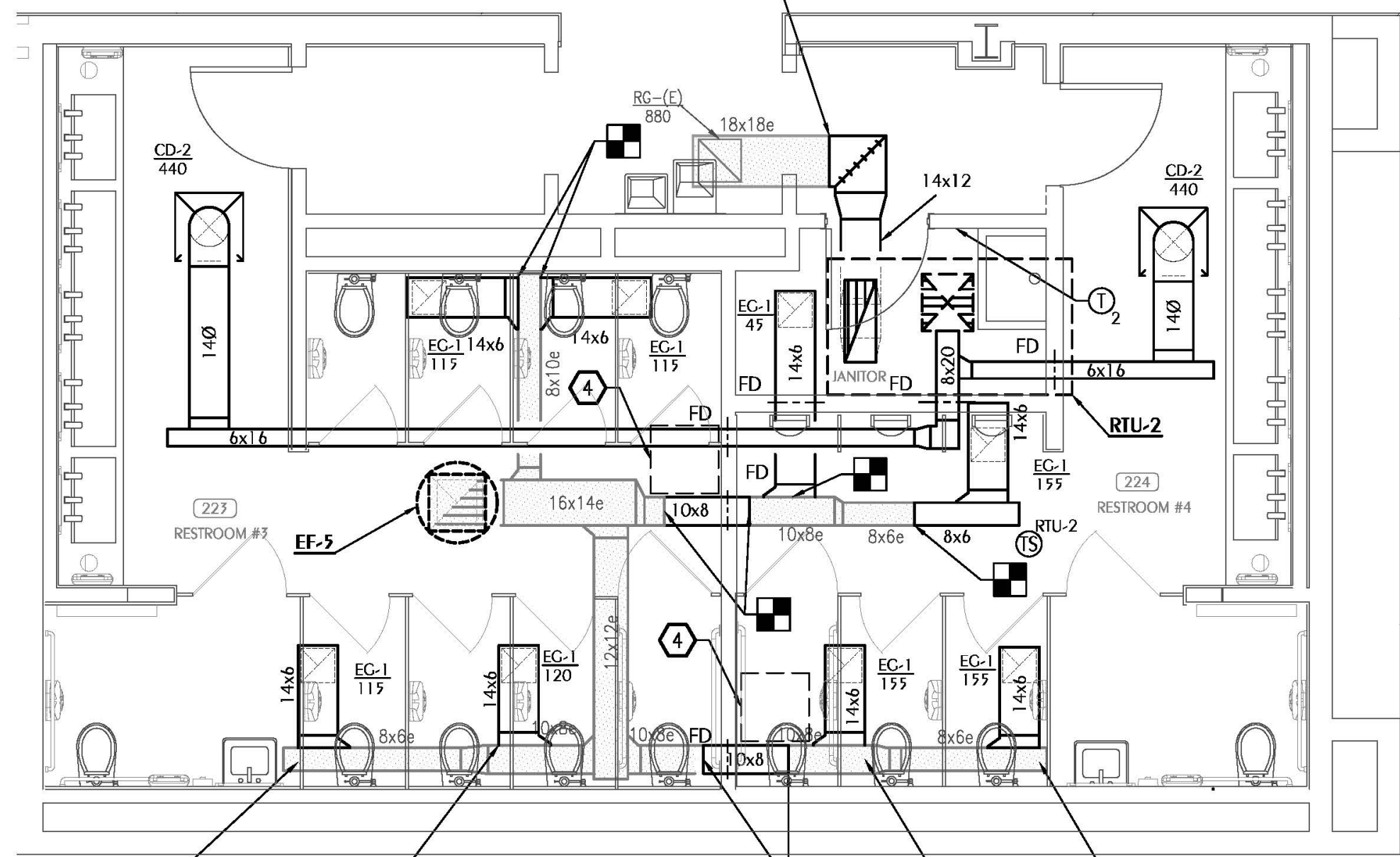
2 RESTROOM 3 & 4 MECHANICAL DEMOLITION PLAN
SCALE: 1/4" = 1'-0"



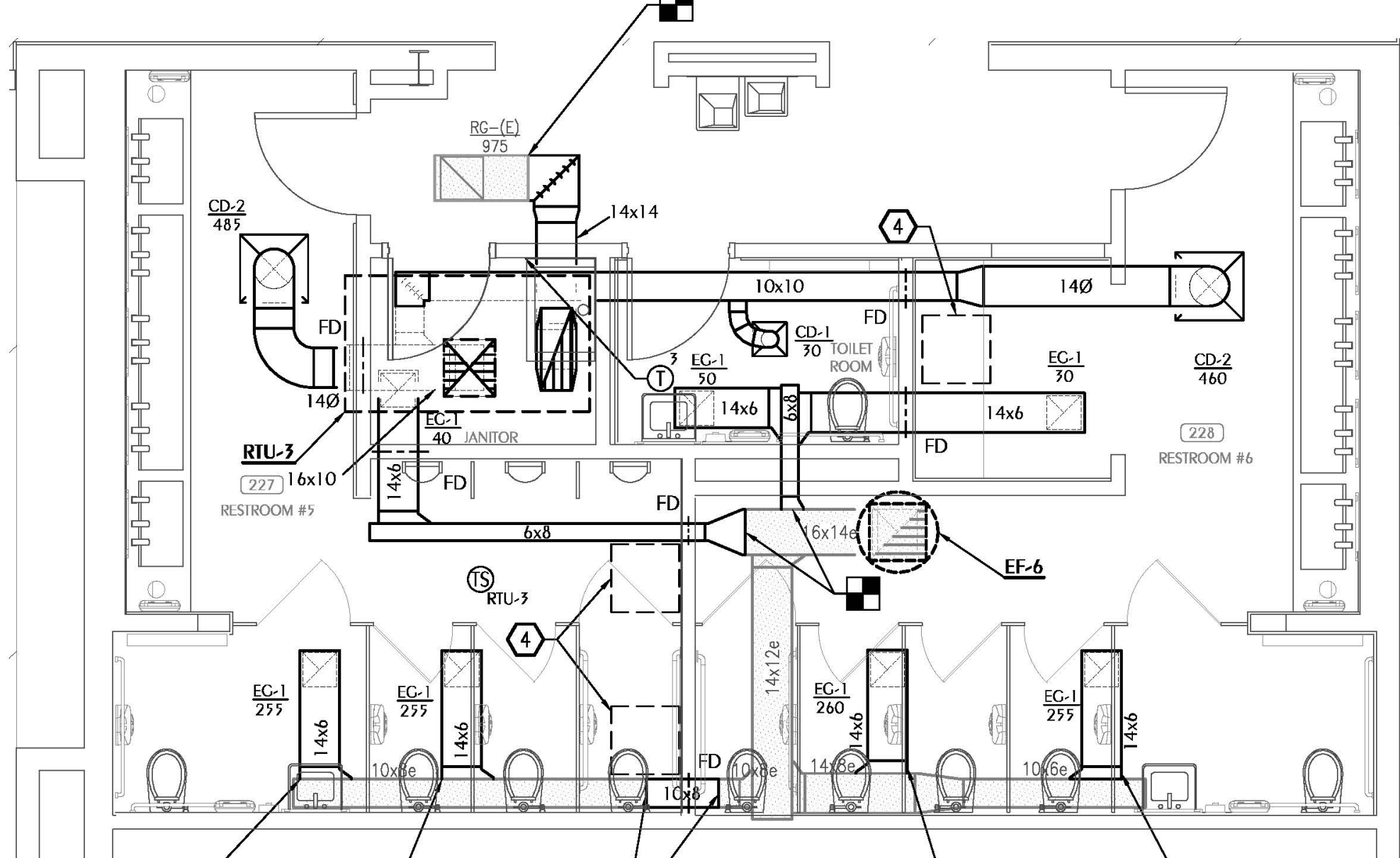
3 RESTROOM 5 & 6 MECHANICAL DEMOLITION PLAN
SCALE: 1/4" = 1'-0"



4 RESTROOM 1 & 2 MECHANICAL NEW WORK PLAN
SCALE: 1/4" = 1'-0"



5 RESTROOM 3 & 4 MECHANICAL NEW WORK PLAN
SCALE: 1/4" = 1'-0"



6 RESTROOM 5 & 6 MECHANICAL NEW WORK PLAN
SCALE: 1/4" = 1'-0"



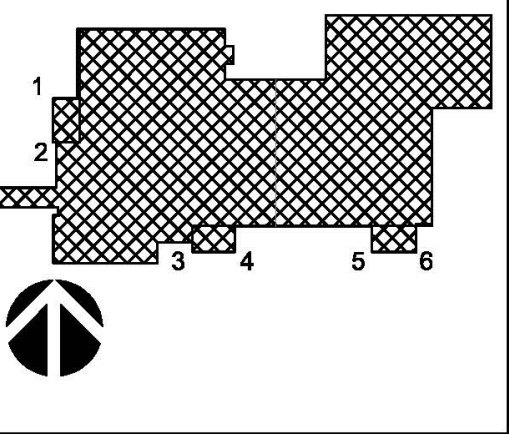


CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS, APPROVALS, AND INSURANCE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS, APPROVALS, AND INSURANCE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS, APPROVALS, AND INSURANCE.

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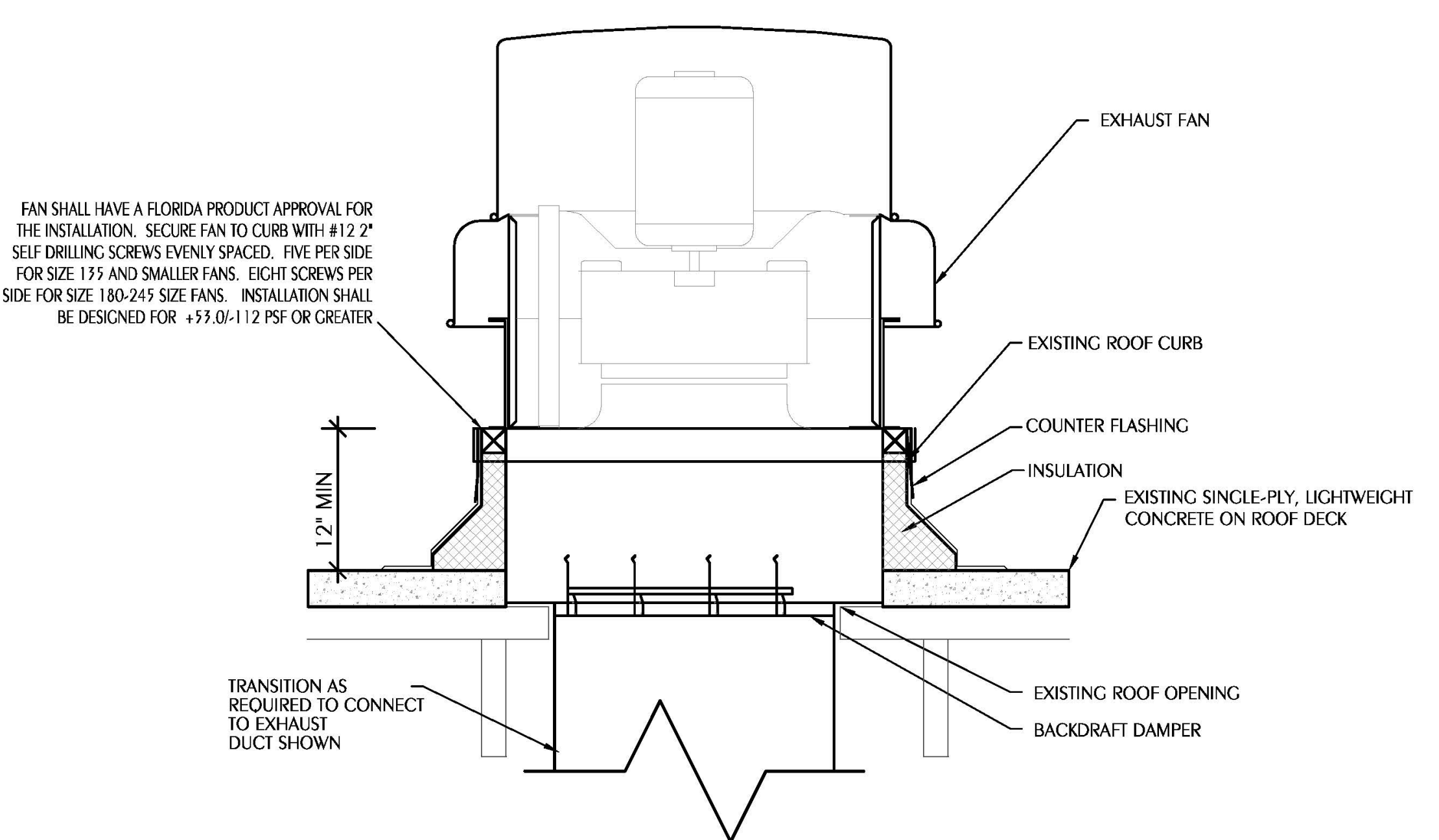
REVISIONS:

No.	Description	Date

HVAC DETAILS

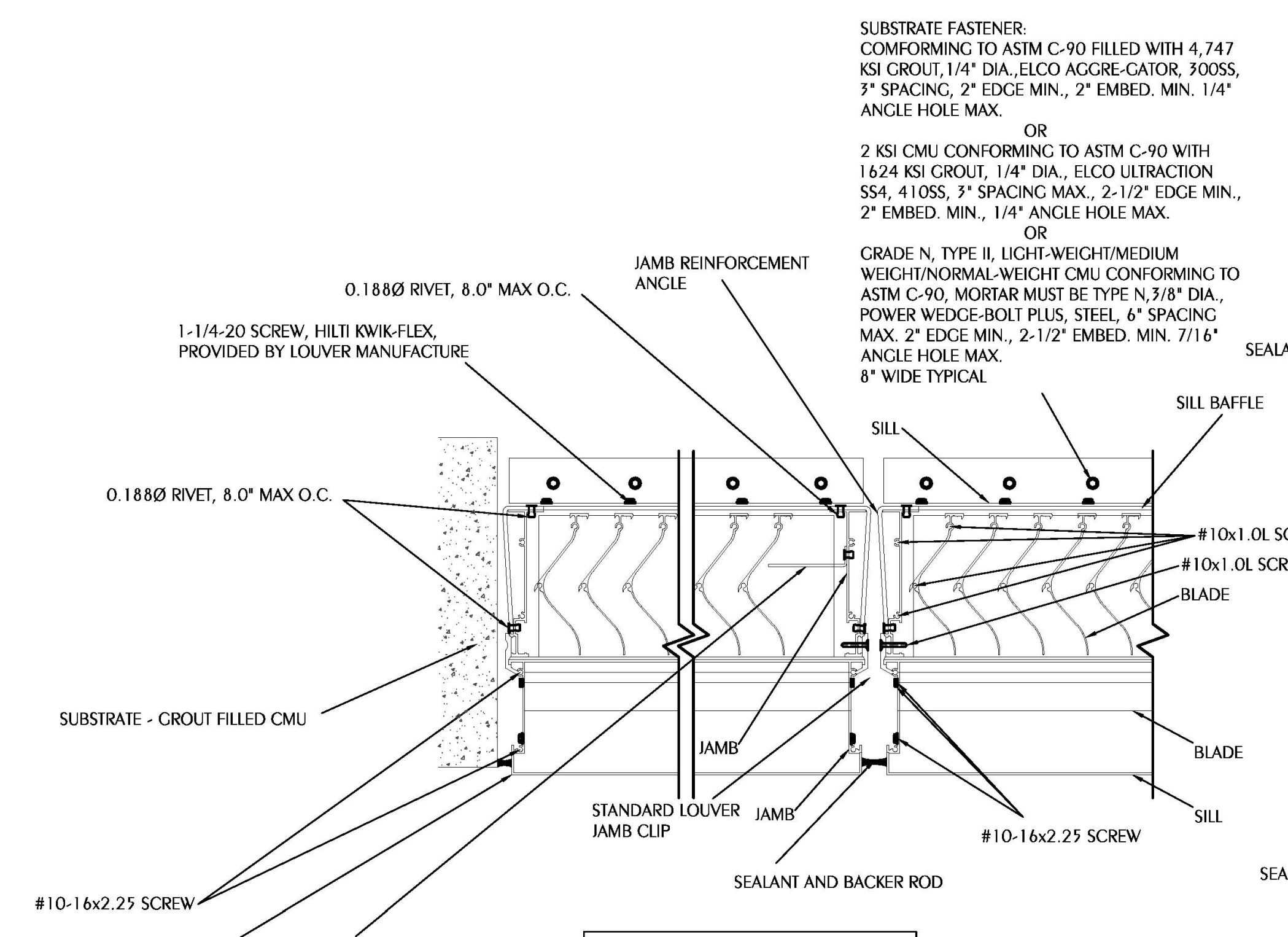
Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

M500
 Scale: As Indicated



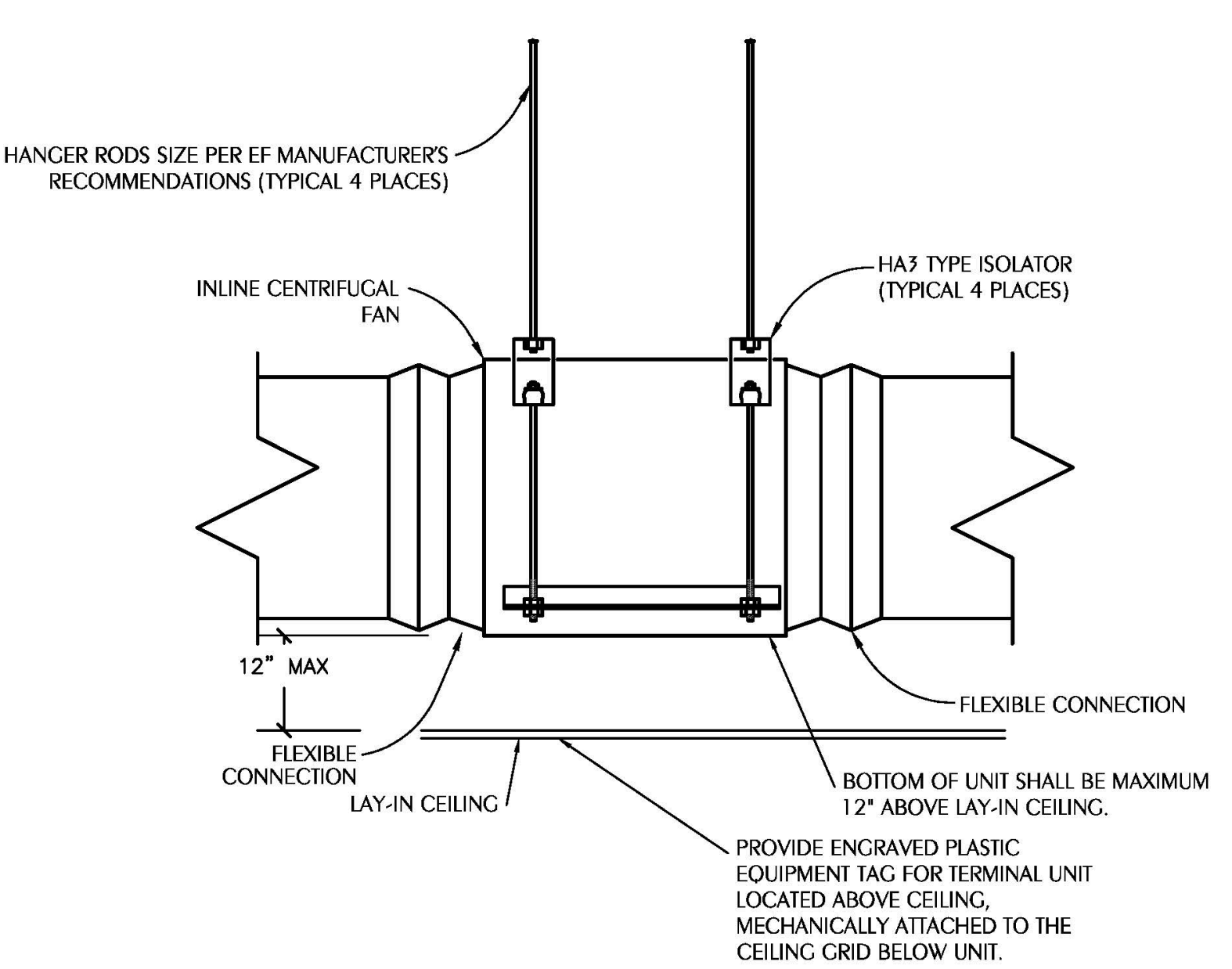
NOTES:
 EXISTING ROOF IS METAL DECK WITH CONCRETE LAYER UNDER STEEL JOIST AT 4'-0" ON CENTER.
 CURB SHALL BE INSTALLED LEVEL AS REQUIRED BY MANUFACTURER'S FLORIDA PRODUCT APPROVAL.
 CURB SHALL BE A MINIMUM OF 12" ABOVE FINISHED ROOF SURFACE.

1 ROOFTOP EXHAUST FAN DETAIL
 M500 SCALE: NONE

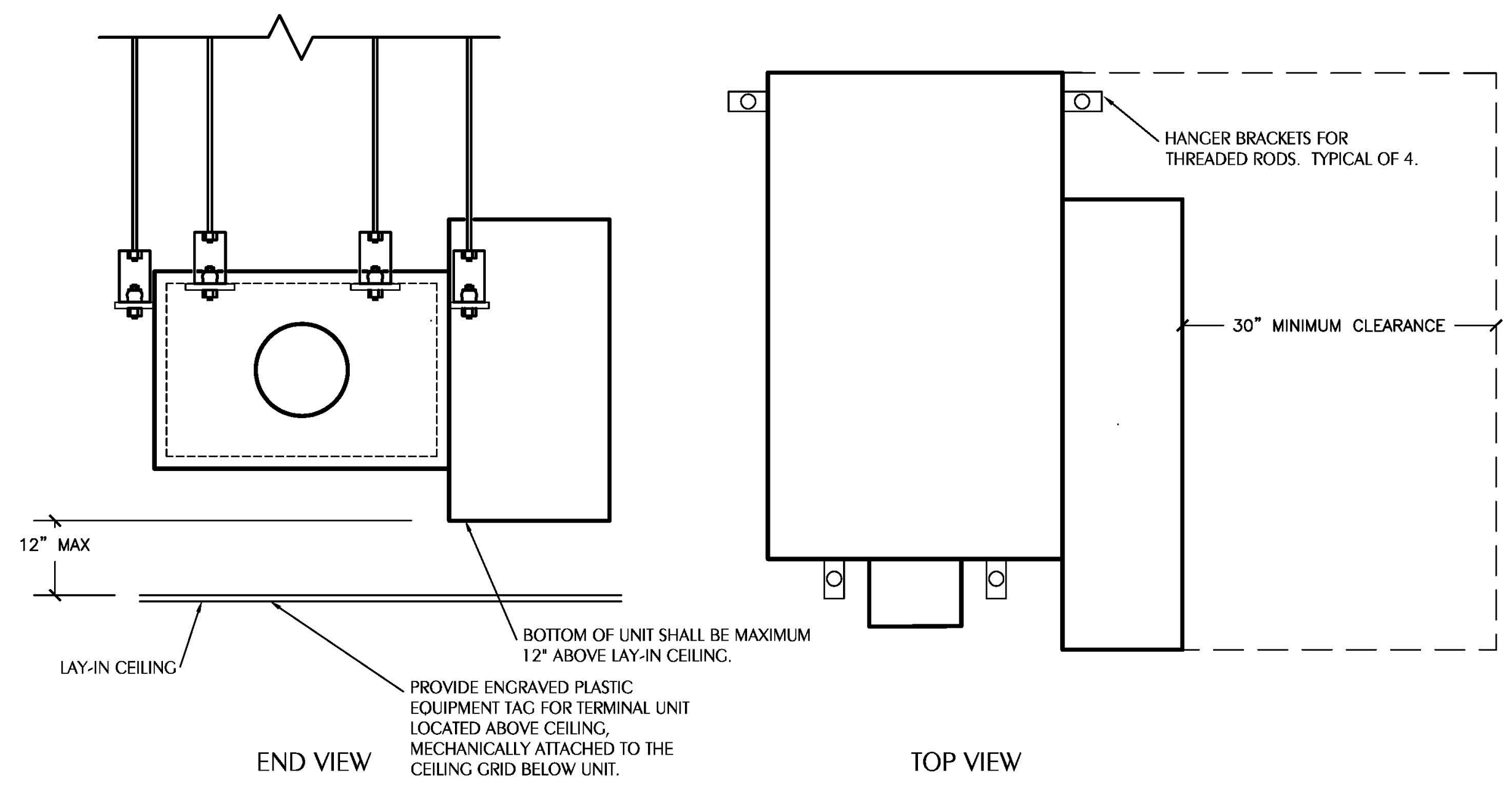


NOTES:
 1. THE INSTALLATION SHOWN HEREIN MUST BE FOLLOWED STRICTLY TO ENSURE COMPLIANCE WITH FLORIDA BUILDING CODE PRODUCT APPROVAL.
 2. CONTINUOUS INSTALLATION ANGLES AND FASTENERS ARE SHIPPED LOOSE AND REQUIRE INSTALLATION IN THE FIELD.
 3. SHIMS MAY BE REQUIRED TO ACHIEVE CONSISTENT CLEARANCE BETWEEN LOUVER AND OPENING ON ALL SIDES.
 4. INSTALLATION DETAIL IS BASED UPON GREENHECK MODEL 'EHV-901 D'. IF AN ALTERNATE MANUFACTURER'S LOUVER IS USED IT MUST BE INSTALLED WITH ITS FLORIDA PRODUCT APPROVAL.

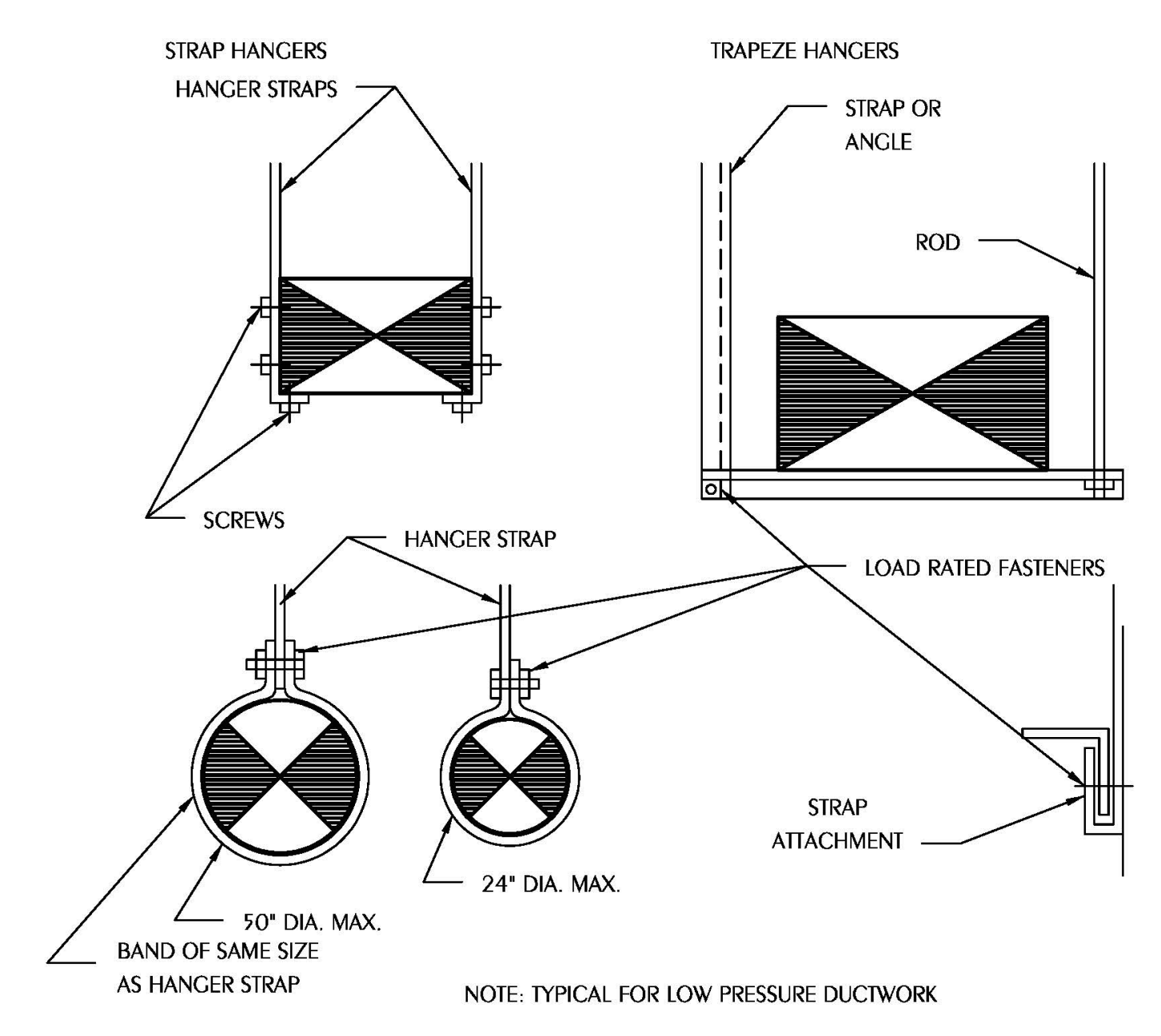
2 WALL LOUVER DETAIL
 M500 SCALE: NONE NOA #:19-0516.09



3 INLINE FAN DETAIL
 M500 SCALE: NONE



4 TERMINAL UNIT MOUNTING DETAIL
 M500 SCALE: NONE



5 DUCT HANGER DETAILS
 M500 SCALE: NONE

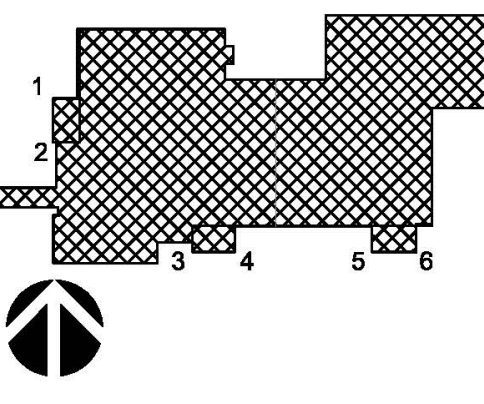


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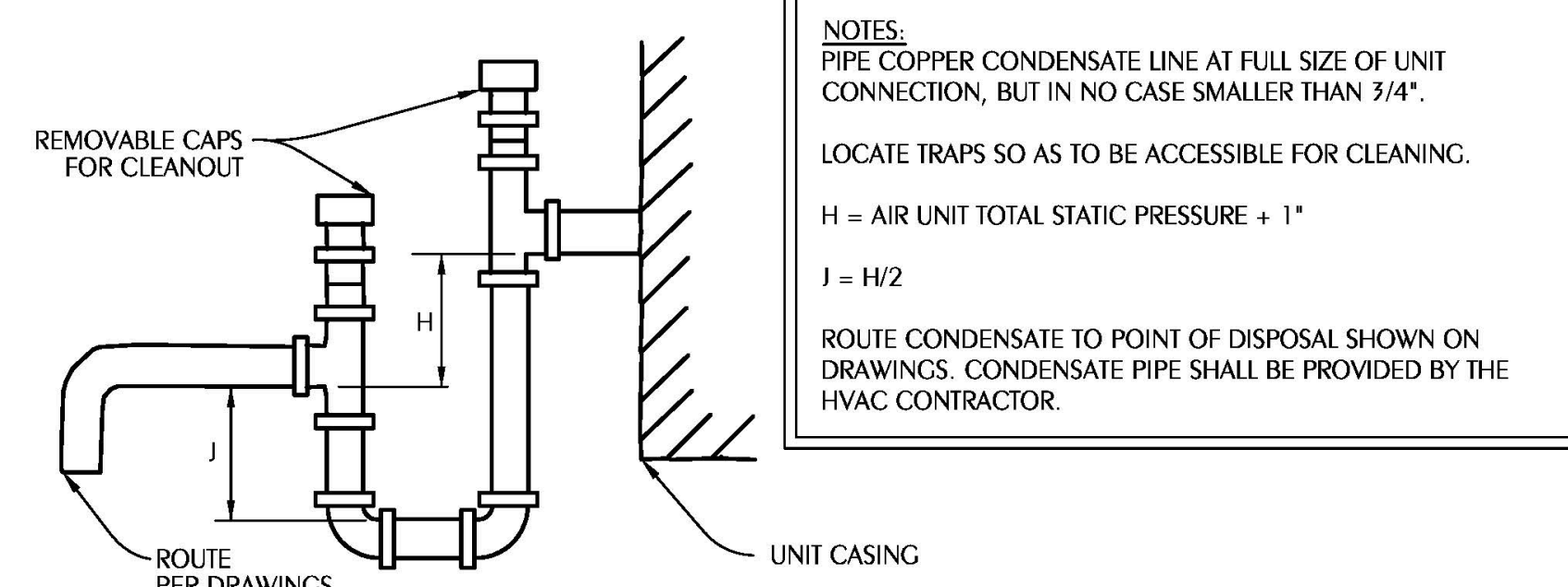


REVISIONS:

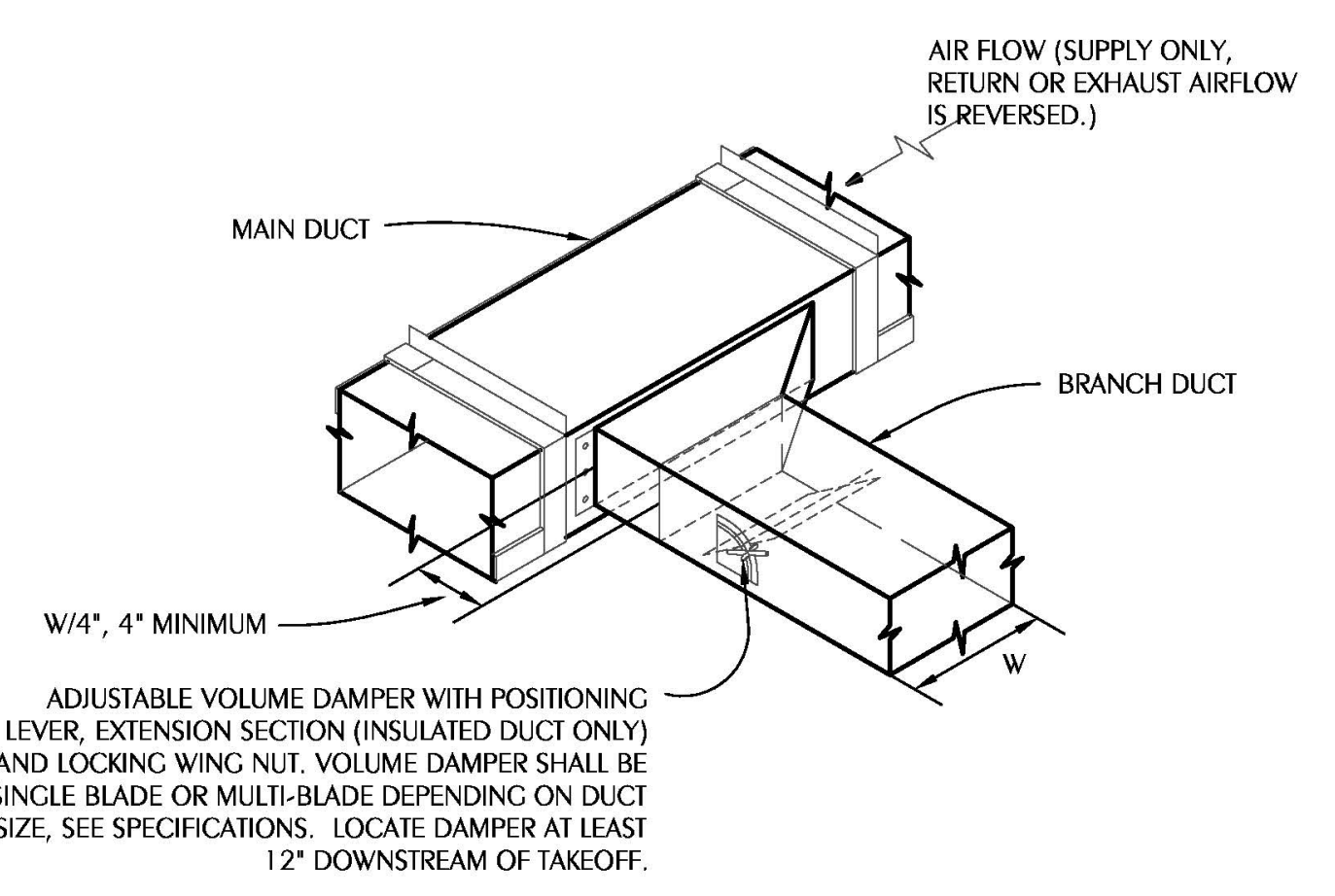
No.	Description	Date

HVAC DETAILS

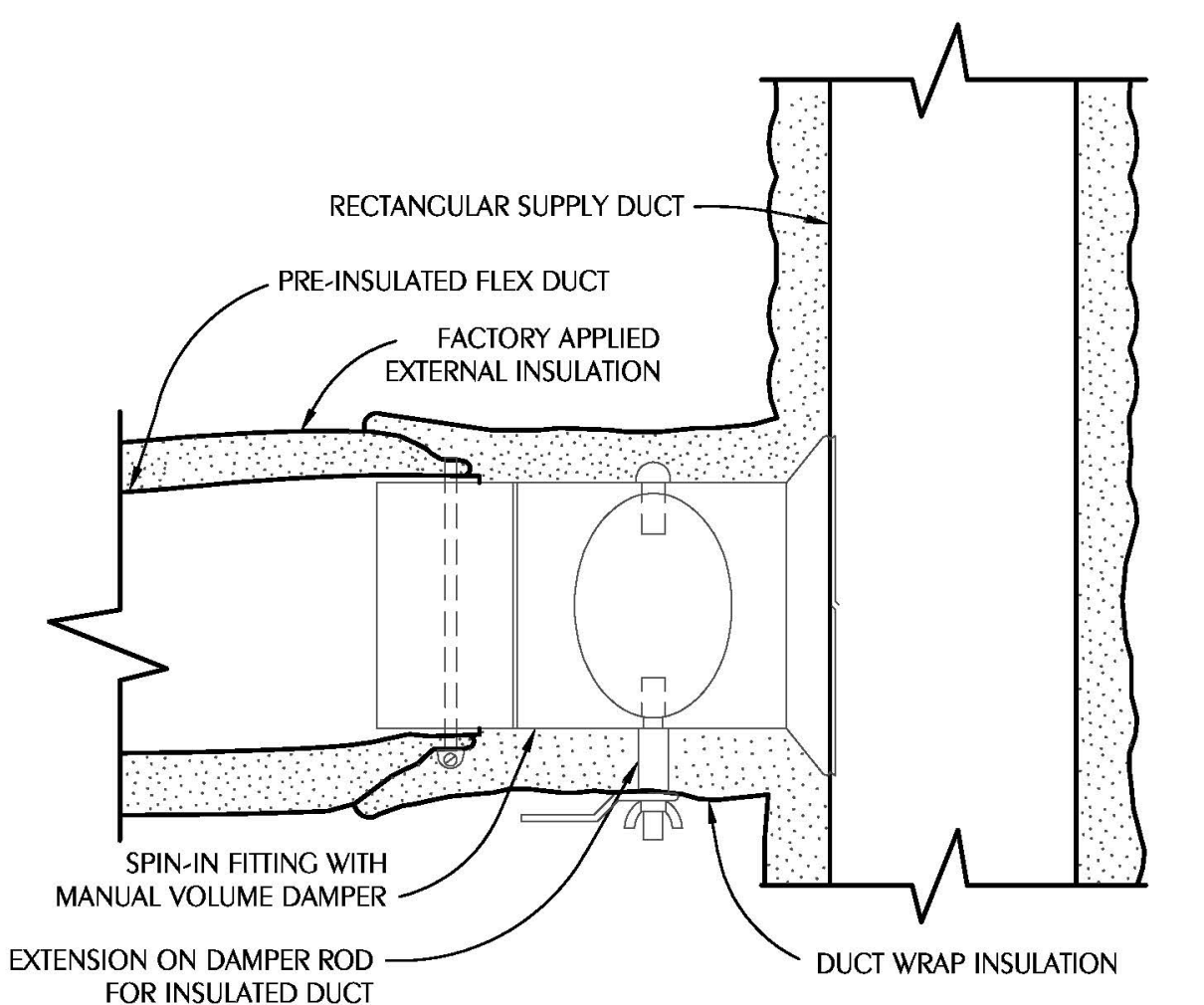
Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ
M501	
Scale	As Indicated



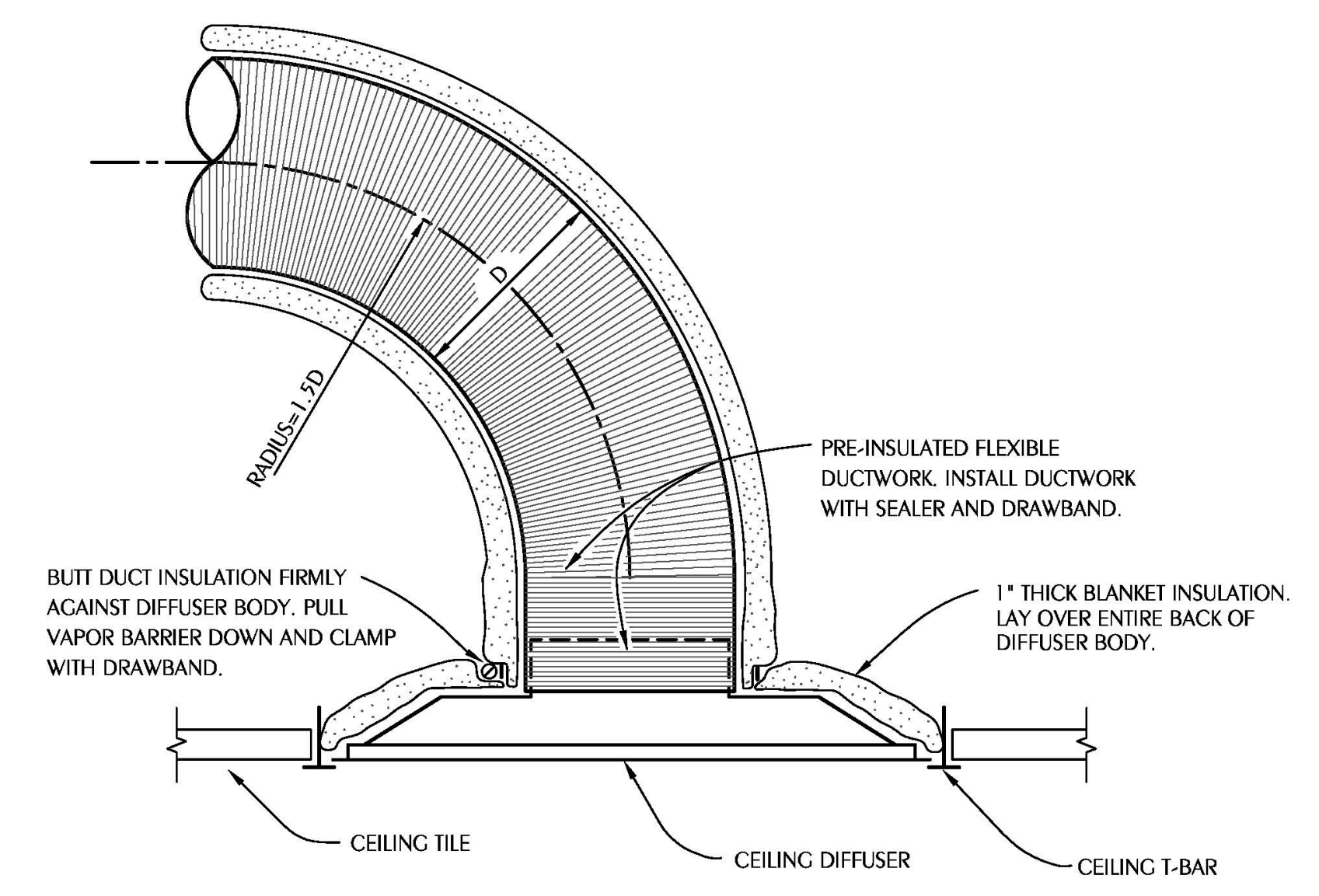
4 TYPICAL NEGATIVE PRESSURE CONDENSATE DRAIN TRAP
M501 SCALE: NONE



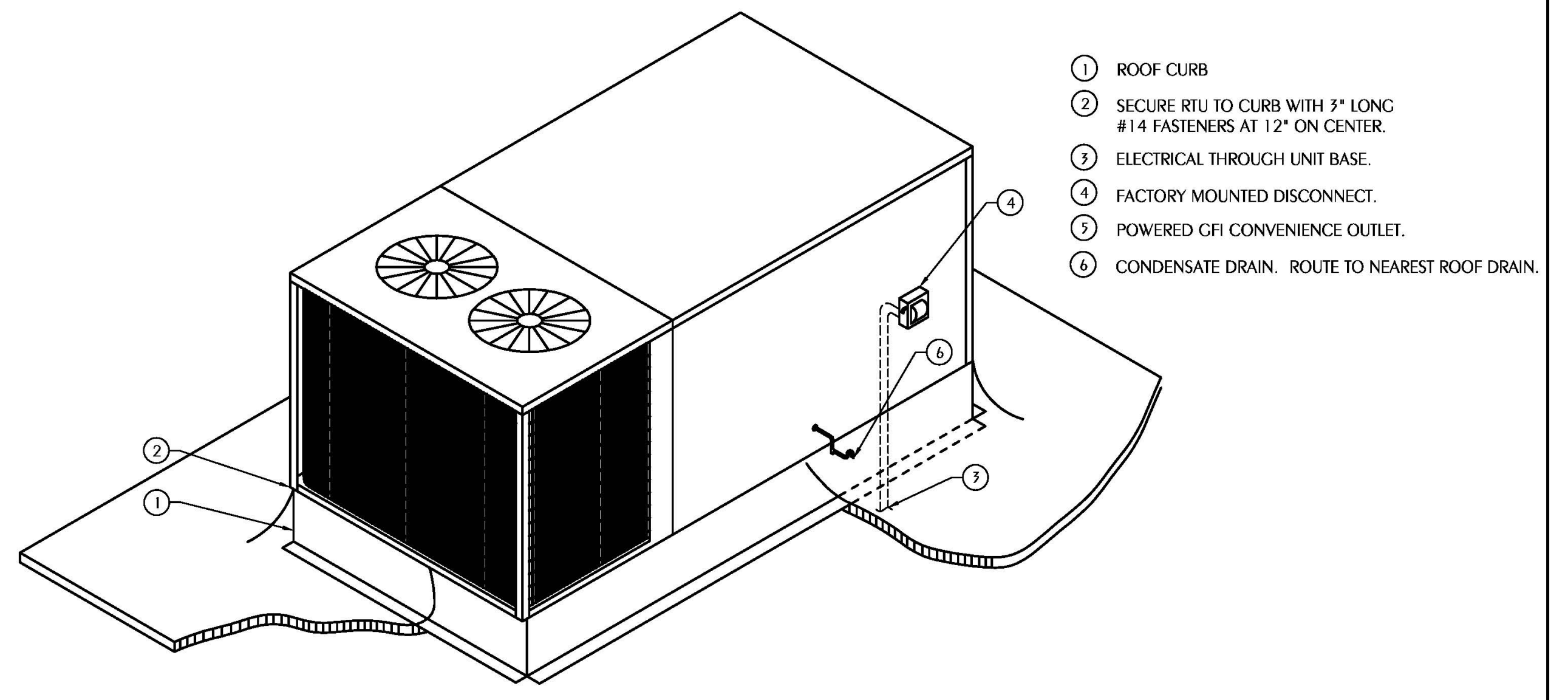
3 TYPICAL BRANCH DUCT TAKEOFF
M501 SCALE: NONE



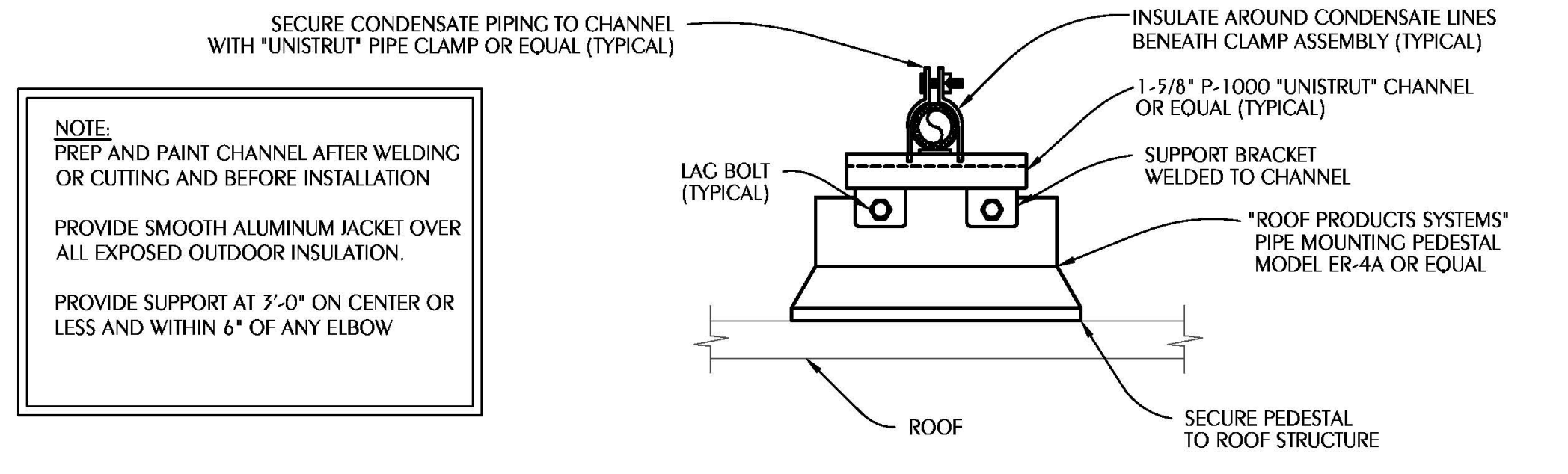
2 TYPICAL FLEX DUCT TAKEOFF DETAIL
M501 SCALE: NONE



1 TYPICAL FLEX DUCT TAKEOFF DETAIL
M501 SCALE: NONE



6 TYPICAL RTU INSTALLATION DETAIL
M501 SCALE: NONE



5 TYPICAL ROOFTOP CONDENSATE PIPE SUPPORT
M501 SCALE: NONE

SEQUENCE OF OPERATION CONSTANT VOLUME AHU-1(E)

STARTING AND STOPPING OF EQUIPMENT SHALL BE ACCOMPLISHED THROUGH A "HAND-OFF-AUTO" SWITCH LOCATED ON FACE OF DDC CONTROL PANEL. AN ALARM SHALL BE POSTED TO THE DDC SYSTEM ANYTIME THE HOA SWITCH IS INDEXED TO THE "HAND" OR "OFF" POSITIONS. WITH THE HOA SWITCH IN THE "AUTO" POSITION, THE UNIT SHALL BE STARTED AUTOMATICALLY BY THE DDC SYSTEM AND ALL CONTROLS ACTIVATED SUBJECT TO FIRE ALARM RELAY, SAFETIES AND OVERLOADS.

OCCUPIED MODE:

OPEN OUTSIDE AIR DAMPER, START OUTSIDE AIR SUPPLY FAN, AND START EXHAUST FANS INDICATED WHENEVER THE BUILDING IS IN OCCUPIED MODE.

PREHEAT CONTROL: ANYTIME THE OUTSIDE AIR TEMPERATURE FALLS BELOW 45°F WITH NO CALL FOR COOLING, THE DDC SHALL MODULATE THE OUTSIDE AIR DUCT MOUNTED GAS PREHEAT COIL TO MAINTAIN A 50°F OUTSIDE AIR SETPOINT. WHEN THE OUTSIDE AIR TEMPERATURE REACHES 40°F, THE DDC SHALL MODULATE THE PREHEAT COIL TO MAINTAIN A 50°F OUTSIDE AIR SETPOINT REGARDLESS OF CALL FOR COOLING.

COOLING COIL FREEZE PROTECTION: THE DDC SYSTEM SHALL CLOSE THE OUTSIDE AIR DAMPER AND TURN OFF OUTSIDE AIR SUPPLY FAN ANYTIME THE COOLING COIL ENTERING AIR TEMPERATURE FALLS BELOW 40°F LONGER THAN 5 MINUTES. THE LOW LIMIT FREEZE STAT SHALL STOP THE AHU FAN MOTOR ANYTIME THE COOLING COIL ENTERING AIR TEMPERATURE FALLS BELOW 35°F.

DISCHARGE TEMPERATURE CONTROL: THE DDC SYSTEM SHALL MODULATE THE CHILLED WATER VALVE AS REQUIRED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE AT SET POINT (REFER TO AHU SCHEDULE). WHEN MINIMUM SPEED IS REACHED AND THERE IS A CALL FOR HEATING FROM ANY ZONE, THE DDC SHALL RESET SUPPLY AIR TEMPERATURE UP IN 2°F INCREMENTS EVERY FIVE MINUTES TO A MAXIMUM OF 65°F. THE DDC SHALL REVERSE SUPPLY AIR RESET UPON A CALL FOR COOLING OR WHEN RETURN AIR RH RISES ABOVE 60%.

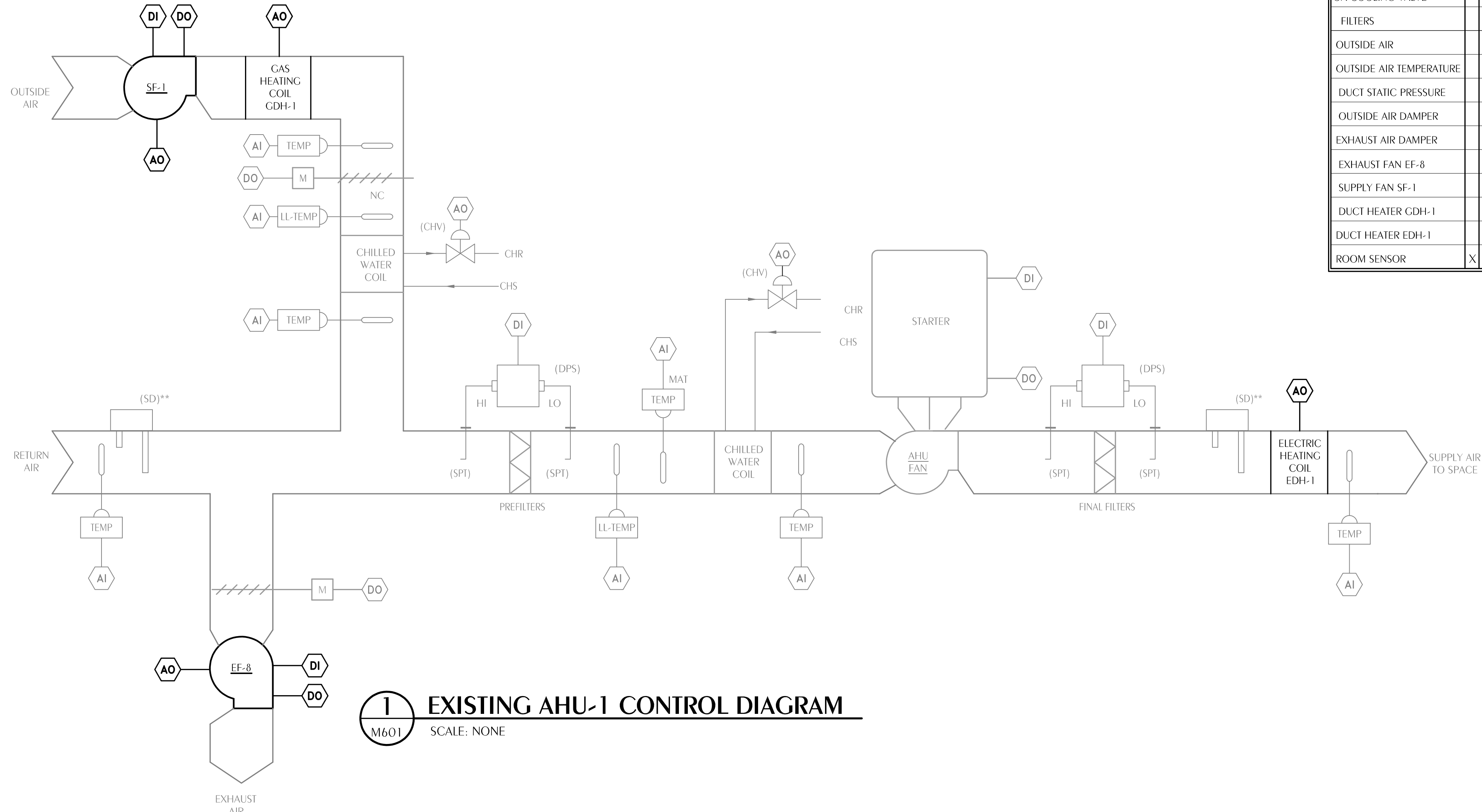
OUTSIDE AIR CONTROL: OUTSIDE AIR DAMPER SHALL BE OPENED AND SF-1 SHALL OPERATE TO MAINTAIN OA AT THE MINIMUM SCHEDULED DURING OCCUPIED CYCLES. UPON A RISE IN RETURN AIR CO2 CONCENTRATION EXCEEDING THE OA CO2 CONCENTRATION MORE THAN 750 PPM, THE DDC SHALL RESET THE OA SETPOINT TO THE MAXIMUM OA VALUES SCHEDULED, AND THROTTLE OUTSIDE AIR SUPPLY FAN UNTIL THE DIFFERENCE IN CO2 CONCENTRATIONS FALLS BELOW 650PPM FOR A MINIMUM OF 1 HOUR. DEDICATED EXHAUST FAN SHALL BE CONTROLLED USING ITS VFD TO MAINTAIN AIRFLOW OF OUTSIDE AIR SUPPLY FAN MINUS 400 CFM. UPON FAILURE THE OA DAMPER SHALL BE NORMALLY CLOSED. WHENEVER THE AHU OPERATES DURING UNOCCUPIED MODE, THE OA DAMPER SHALL REMAIN CLOSED AND SF-1 SHALL BE OFF. OUTSIDE AIR SHALL HAVE A GAS DUCT HEATER. DUCT HEATER SHALL MODULATE TO MAINTAIN 50°F OUTSIDE AIR TEMPERATURE. A CHILLED WATER COIL IS INCLUDED TO MAINTAIN 5°F LEAVING AIR TEMPERATURE FOR OUTSIDE AIR.

UNOCCUPIED MODE: THE OA DAMPER SHALL SHUT, THE OUTSIDE AIR SUPPLY FAN SHALL TURN OFF, AND THE AHU FAN SHALL CYCLE UPON A CALL FOR COOLING OR HEATING FROM ANY SPACE.

ADAPTIVE RECOVERY MODE:

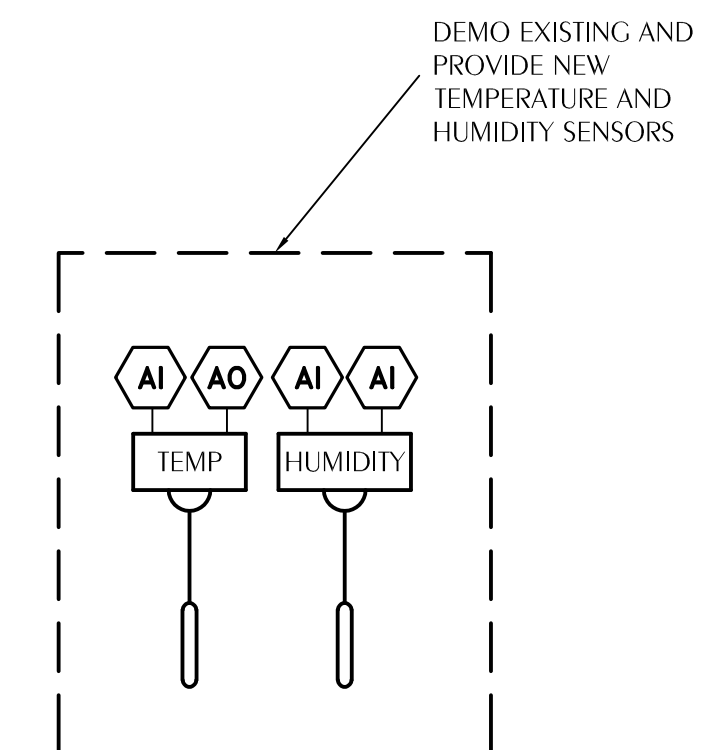
THE EQUIPMENT SHALL OPERATE IN UNOCCUPIED MODE WITH OCCUPIED MODE SETPOINTS TO RECOVER FROM UNOCCUPIED MODE. THE DDC SHALL CALCULATE RECOVERY TIME BASED UPON INDOOR TEMPERATURE AND OUTDOOR TEMPERATURE AND ADJUST START TIME ACCORDINGLY.

INTERLOCKED EXHAUST FANS: INTERLOCKED EXHAUST FANS SHALL OPERATE ONLY DURING OCCUPIED TIMES.



1 EXISTING AHU-1 CONTROL DIAGRAM
M601 SCALE: NONE

SYSTEM POINT DESCRIPTION	CONSTANT VOLUME AHU-1(E) POINTS LIST														
	ANALOG				DIGITAL				SYSTEMS FEATURES						
	INPUT		OUTPUT		INPUT		OUTPUT		ALARMS			PROGRAMS			
	TEMPERATURE	TEMPERATURE	TEMPERATURE	TEMPERATURE	STATUS	STATUS	STATUS	STATUS	LOW ANALOG	LOW ANALOG	LOW ANALOG	LOW ANALOG	TIME SCHEDULING	TIME SCHEDULING	TIME SCHEDULING
CONTROL PANEL	X														
FAN CONTROL					X	X		X					X	X	X
RETURN AIR	X								X	X	X				
MIXED AIR	X								X	X	X				
CHWC DISCHARGE AIR	X								X	X	X				
OA CHWC DISCHARGE AIR	X								X	X	X				
COOLING VALVE				X											
OA COOLING VALVE				X											
FILTERS						X			X	X					
OUTSIDE AIR	X								X	X	X				
OUTSIDE AIR TEMPERATURE	X								X	X	X				
DUCT STATIC PRESSURE		X							X	X	X				
OUTSIDE AIR DAMPER									X						
EXHAUST AIR DAMPER									X						
EXHAUST FAN EF-8				X	X		X								
SUPPLY FAN SF-1				X	X		X								
DUCT HEATER GDH-1					X										
DUCT HEATER EDH-1					X										
ROOM SENSOR	X	X	X	X					X	X	X				

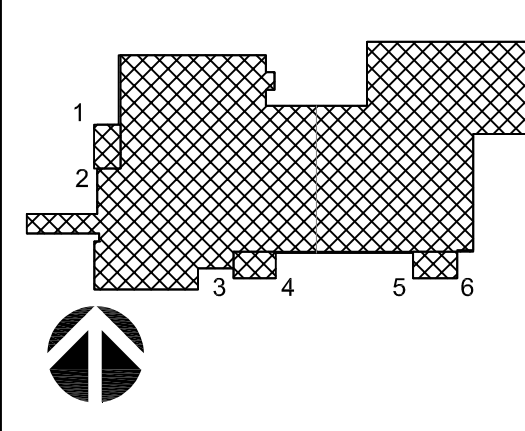


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PURSUANT TO FLORIDA STATUTES, SECTION 689.05, AN INDIVIDUAL EMPLOYEE OR AGENT MAY NOT BE HELD INDIVIDUALLY LIABLE FOR NEGLIGENCE.

BID DOCUMENTS

DESTIN FORT WALTON BEACH CONVENTION CENTER
HVAC UPGRADES & RESTROOM RENOVATIONS
 TASK ORDER NO. 8 & NO. 5 - C-18-2638-TDD
 1250 MIRACLE STRIP PKWY SE
 FORT WALTON BEACH, FL 32548



REVISIONS:

No.	Description	Date

HVAC CONTROLS

Project number	17057.8
Dated	04-12-21
PIC	DNW
PM	KAJ

M601

Scale As Indicated



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 David N. Watford, PE
 Florida License Number: 62208
 Project Number: 2020-036

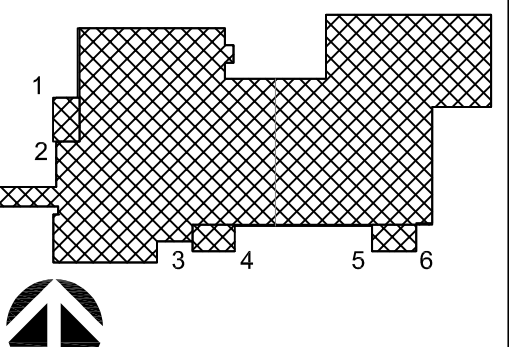


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PURSUANT TO FLORIDA STATUTES, SECTION 689.08, AN INDIVIDUAL EMPLOYEE OR AGENT MAY NOT BE HELD INDIVIDUALLY LIABLE FOR NEGLIGENCE.

BID DOCUMENTS

DESTIN FORT WALTON BEACH CONVENTION CENTER HVAC UPGRADES & RESTROOM RENOVATIONS TASK ORDER NO. 8 & NO. 5 - C-18-2638-TDD 1250 MIRACLE STRIP PKWY SE FORT WALTON BEACH, FL 32548



REVISIONS:

Table with 3 columns: No., Description, Date

HVAC CONTROLS

Table with 2 columns: Project number, Date

M603

Scale As Indicated

SINGLE ZONE VARIABLE VOLUME AHU POINTS LIST

Table with columns: SYSTEM POINT DESCRIPTION, ANALOG (INPUT, OUTPUT), DIGITAL (INPUT, OUTPUT), SYSTEMS FEATURES (ALARMS, PROGRAMS)

SEQUENCE OF OPERATION SINGLE ZONE VARIABLE VOLUME AHU

STARTING AND STOPPING OF EQUIPMENT SHALL BE ACCOMPLISHED THROUGH A "HAND-OFF-AUTO" SWITCH LOCATED ON FACE OF DDC CONTROL PANEL...

OCCUPIED MODE: OPEN THE OUTSIDE AIR DAMPERS AND START EXHAUST FANS INDICATED ON FAN SCHEDULE WHENEVER THE BUILDING IS IN OCCUPIED MODE.

PREHEAT CONTROL: ANYTIME THE MIXED AIR TEMPERATURE FALLS BELOW 45°F WITH NO CALL FOR COOLING, THE DDC SHALL MODULATE THE SCR CONTROLLED ELECTRIC PREHEAT COIL TO MAINTAIN A 50°F SETPOINT...

COOLING COIL FREEZE PROTECTION: THE DDC SYSTEM SHALL CLOSE THE OUTSIDE AIR DAMPER ANYTIME THE ENTERING CHILLED WATER COIL AIR TEMPERATURE FALLS BELOW 40°F LONGER THAN 5 MINUTES...

DISCHARGE TEMPERATURE CONTROL: THE DDC SYSTEM SHALL MODULATE THE CHILLED WATER VALVE AS REQUIRED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE AT SET POINT (REFER TO AHU AND BCU SCHEDULES) UNTIL MINIMUM SPEED IS REACHED...

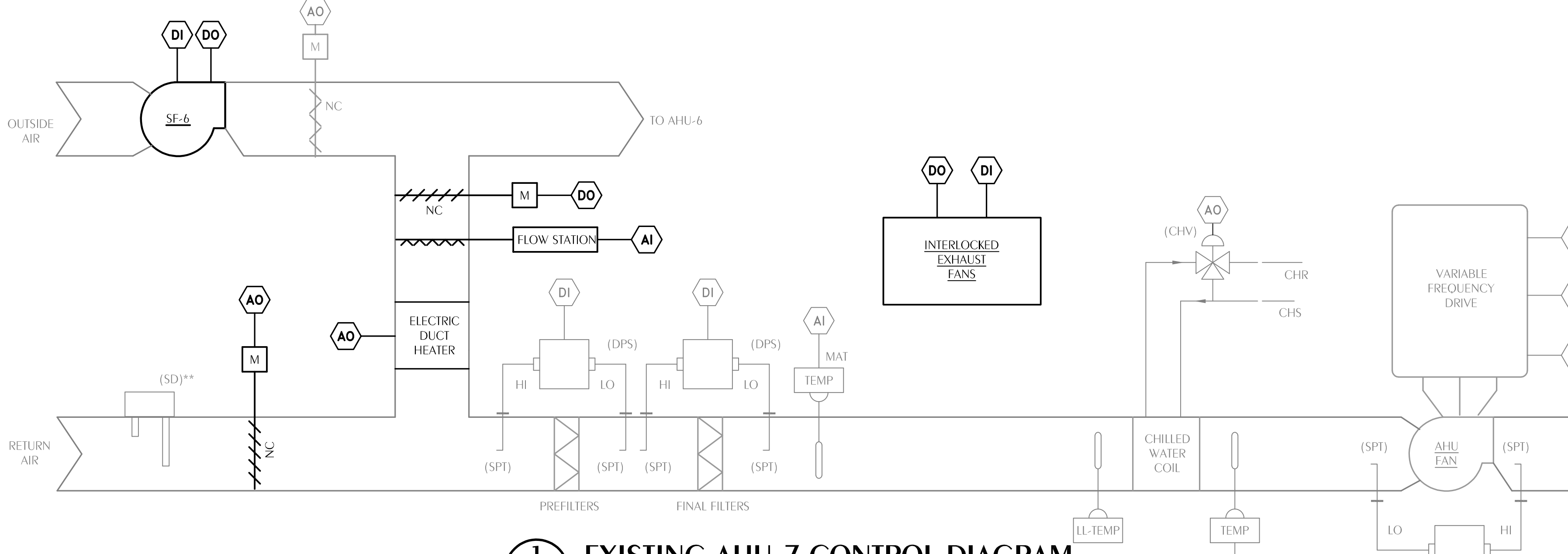
FAN SPEED CONTROL: SUBJECT TO HIGH LIMIT DUCT STATIC PRESSURE SENSOR, AHU AIRFLOW SHALL BE LIMITED TO SCHEDULED MAXIMUM AND MINIMUM VALUES. THE DDC SHALL MODULATE FAN SPEED WITH THE AHU'S ECM FAN MOTORS VIA A 0-10V SIGNAL...

OUTSIDE AIR CONTROL: THE DDC SYSTEM, WITH OA DUCT MOUNTED FLOW MEASURING STATION, SHALL MODULATE RA AND OA DAMPERS AS REQUIRED TO MAINTAIN OUTSIDE AIR QUANTITY AT SET POINT REGARDLESS OF THE TOTAL AIR FLOW OF THE AIR HANDLING UNIT...

UNOCCUPIED MODE: THE DDC SHALL CYCLE THE FAN AND COOLING OR HEATING COIL AS NECESSARY TO MAINTAIN SETPOINT OF 83°F (ADJUSTABLE) FOR COOLING AND 60°F (ADJUSTABLE) FOR HEATING...

ADAPTIVE RECOVERY MODE: THE EQUIPMENT SHALL OPERATE IN UNOCCUPIED MODE WITH OCCUPIED MODE SETPOINTS TO RECOVER FROM UNOCCUPIED MODE...

INTERLOCKED EXHAUST FANS: INTERLOCKED EXHAUST FANS SHALL OPERATE ONLY DURING OCCUPIED TIMES.



1 EXISTING AHU-7 CONTROL DIAGRAM SCALE: NONE

FAN POWERED TU POINTS LIST

Table with columns: SYSTEM POINT DESCRIPTION, ANALOG (INPUT, OUTPUT), DIGITAL (INPUT, OUTPUT), SYSTEMS FEATURES (ALARMS, PROGRAMS)

SEQUENCE OF OPERATION FAN POWERED TERMINAL UNIT

EACH TERMINAL UNIT SHALL BE PROVIDED WITH A UNIT CONTROL MODULE (UCM). THE UCM SHALL BE FIELD OR FACTORY MOUNTED. THE ELECTRICAL CONTRACTOR SHALL PROVIDE 120V POWER TO EACH TERMINAL UNIT...

UNIT AIRFLOW SHALL BE MONITORED BY AN INTEGRAL, MULTIPLE POINT, AVERAGING FLOW SENSING DEVICE AND A TRANSDUCER TO MAINTAIN AIRFLOW WITHIN 5% OF RATED CFM DOWN TO A MINIMUM CFM AS SCHEDULED...

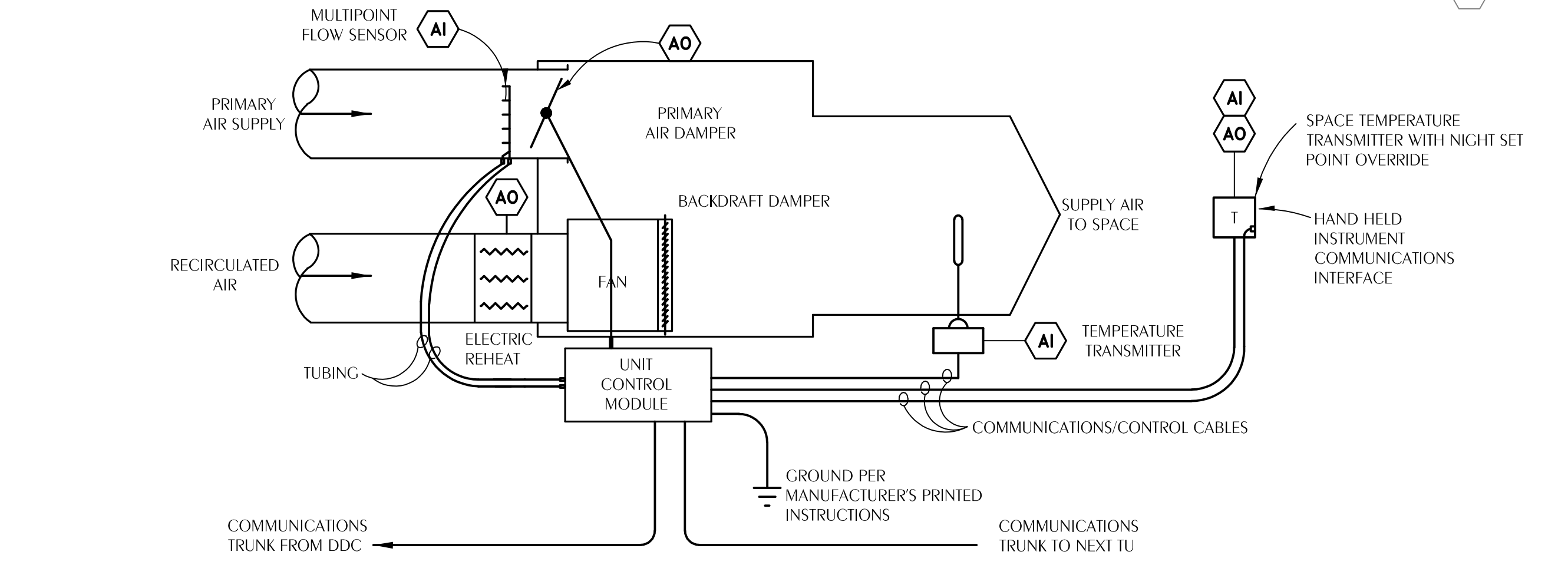
COOLING MODE: THE UCM SHALL MONITOR THE ZONE TEMPERATURE AGAINST ITS SET POINT (74°F ADJUSTABLE) AND MODULATE THE PRIMARY AIR DAMPER TO MEET THE ZONE SETPOINT...

HEATING MODE: THE PRIMARY DAMPER SHALL MODULATE TO THE HEATING AIRFLOW (MINIMUM PRIMARY AIRFLOW = 35% OF MAXIMUM). THE TERMINAL UNIT FAN SHALL MODULATE TO RECIRCULATE RETURN AIR UNTIL REACHING FULL SPEED...

THE ZONE TEMPERATURE SENSOR WITH SET POINT ADJUSTMENT SHALL BE PROVIDED WITH NIGHT SETBACK OVERRIDE, AND A COMMUNICATIONS JACK. UPPER AND LOWER ZONE TEMPERATURE SET POINTS SHALL BE SET BY THE DDC.

OCCUPIED/UNOCCUPIED MODE: CONTROLS CONTRACTOR SHALL CONSULT WITH OWNER FOR SPACE TEMPERATURE SETPOINTS.

OVERRIDE MODE: THE OVERRIDE TIMER SHALL PLACE THE TU AND AHU IN OCCUPIED MODE FOR ONE HOUR (ADJUSTABLE).



2 FAN POWERED TU CONTROL DIAGRAM SCALE: NONE

SEQUENCE OF OPERATION SINGLE DUCT TERMINAL UNIT

EACH TERMINAL UNIT SHALL BE PROVIDED WITH A UNIT CONTROL MODULE (UCM). THE UCM SHALL BE FIELD OR FACTORY MOUNTED. THE ELECTRICAL CONTRACTOR SHALL PROVIDE 120V POWER TO EACH TERMINAL UNIT...

UNIT AIRFLOW SHALL BE MONITORED BY AN INTEGRAL, MULTIPLE POINT, AVERAGING FLOW SENSING DEVICE AND A TRANSDUCER TO MAINTAIN AIRFLOW WITHIN 5% OF RATED CFM DOWN TO A MINIMUM CFM AS SCHEDULED...

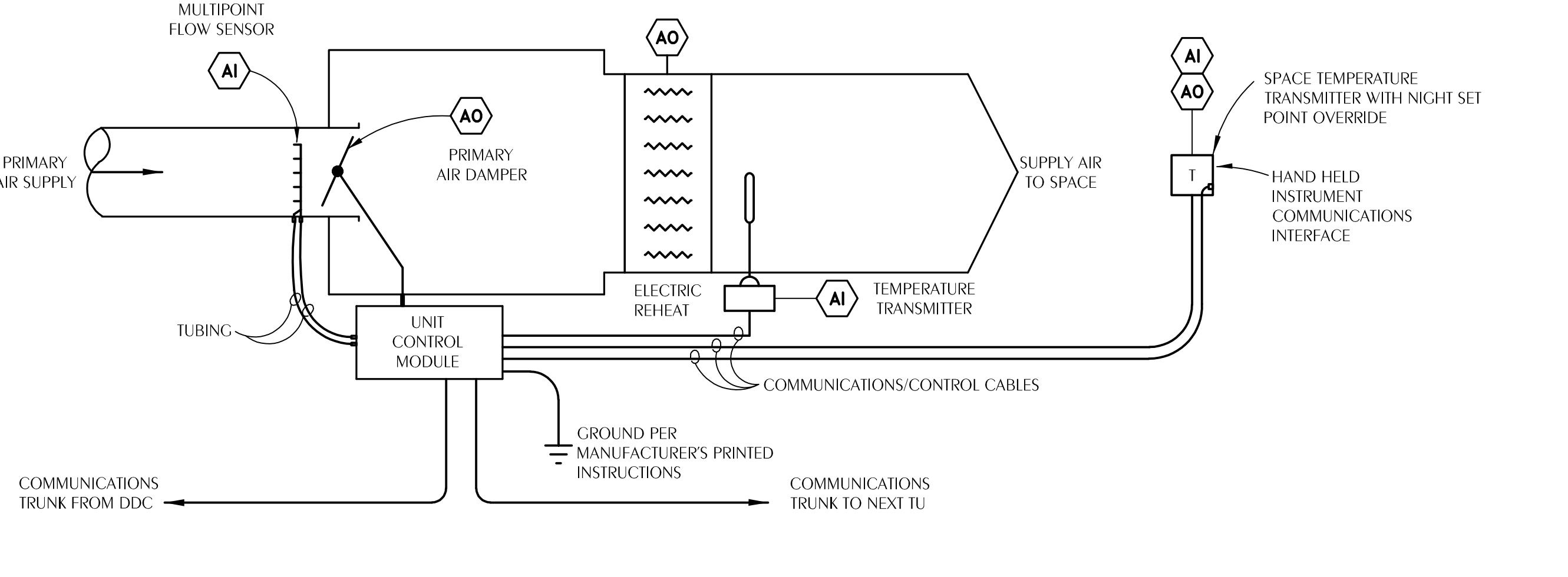
COOLING MODE: THE UCM SHALL MONITOR THE ZONE TEMPERATURE AGAINST ITS SET POINT (74°F ADJUSTABLE) AND MODULATE THE DAMPER TO MEET THE ZONE SETPOINT...

HEATING MODE: THE DAMPER SHALL MODULATE TO THE HEATING AIRFLOW (SEE TU SCHEDULES) AND THE HOT WATER VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN SPACE TEMPERATURE (COOLING SET POINT MINUS 3°F).

THE ZONE TEMPERATURE SENSOR WITH SET POINT ADJUSTMENT SHALL BE PROVIDED WITH NIGHT SETBACK OVERRIDE, AND A COMMUNICATIONS JACK. UPPER AND LOWER ZONE TEMPERATURE SET POINTS SHALL BE SET BY THE DDC.

OCCUPIED/UNOCCUPIED MODE: CONTROLS CONTRACTOR SHALL CONSULT WITH OWNER FOR SPACE TEMPERATURE SETPOINTS.

OVERRIDE MODE: THE OVERRIDE TIMER SHALL PLACE THE TU AND AHU IN OCCUPIED MODE FOR ONE HOUR (ADJUSTABLE).



3 SINGLE DUCT TU CONTROL DIAGRAM SCALE: NONE

SINGLE DUCT TU POINTS LIST

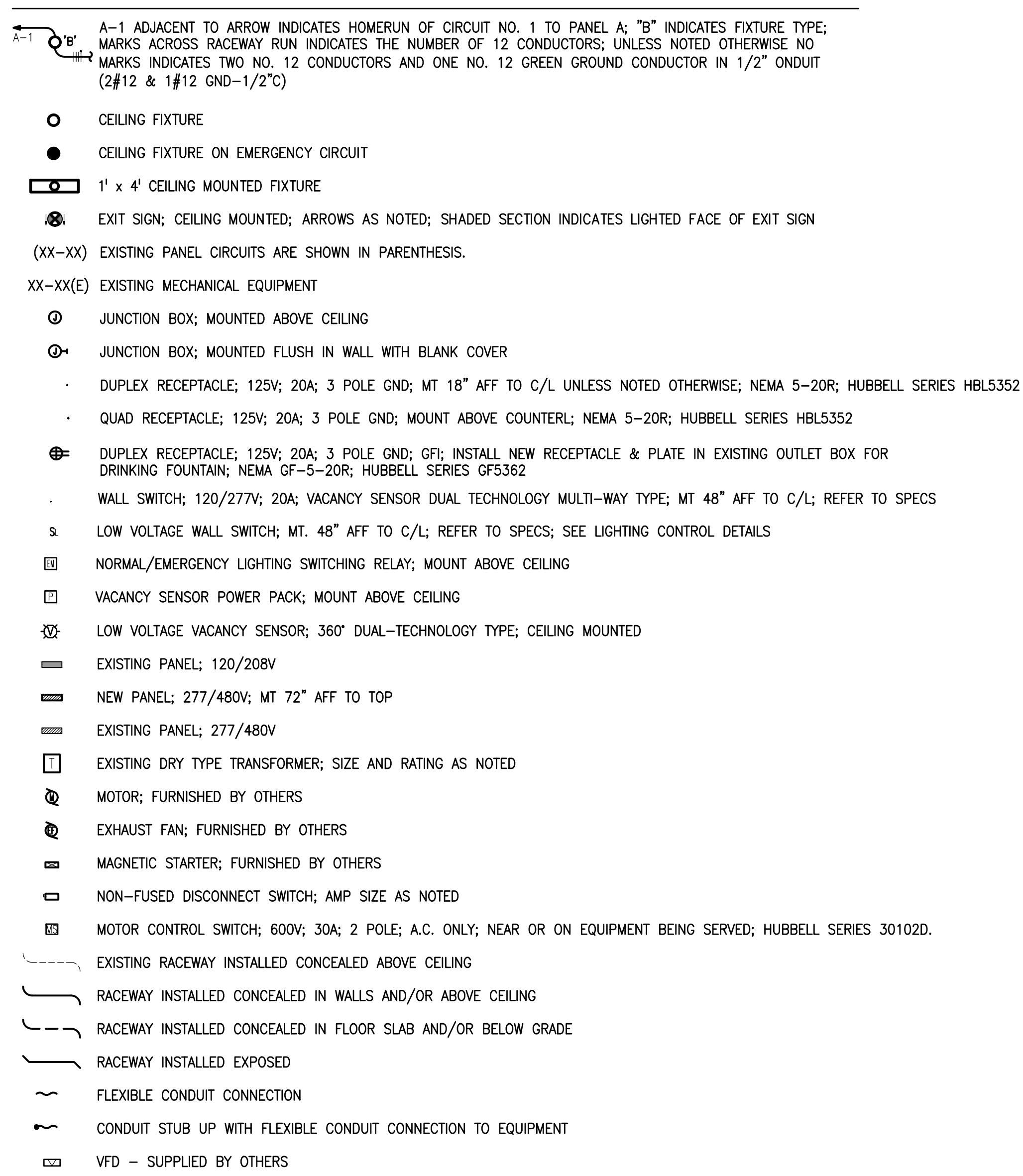
Table with columns: SYSTEM POINT DESCRIPTION, ANALOG (INPUT, OUTPUT), DIGITAL (INPUT, OUTPUT), SYSTEMS FEATURES (ALARMS, PROGRAMS)



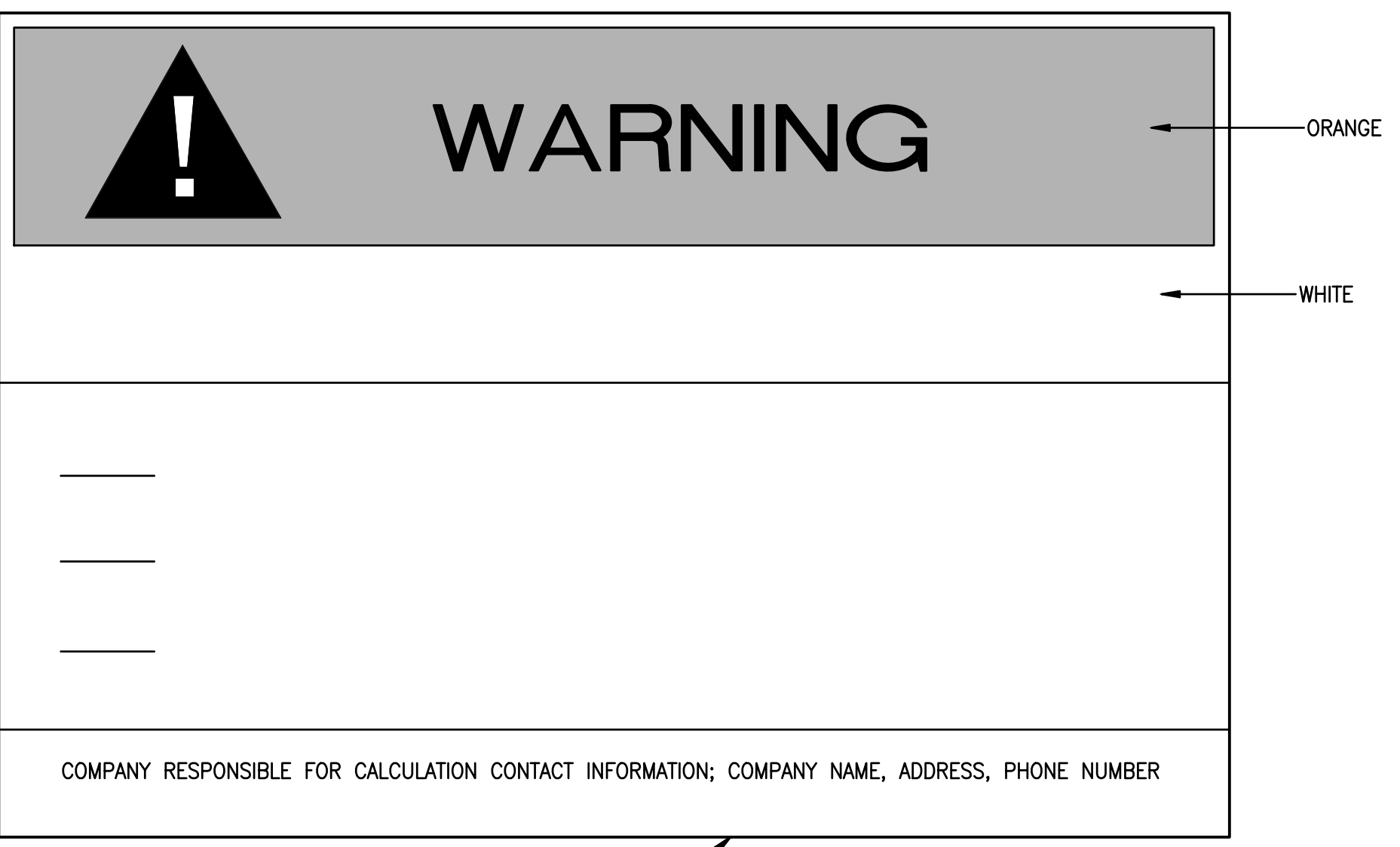
THE LOCATIONS OF ALL ELECTRICAL EQUIPMENT INDICATED MAY VARY FROM DRAWING. EXISTING CONDITIONS AND DEMOLITION WORK WAS DETERMINED BY SITE OBSERVATION AND REVIEW OF EXISTING DOCUMENTS WITHOUT THE BENEFIT OF DESTRUCTIVE INVESTIGATION. VERIFY ACTUAL LOCATIONS, TYPES, AND QUANTITIES OF EQUIPMENT AND APPLY DEMOLITION NOTES AS APPROPRIATE FOR THE EQUIPMENT AND ROOM OR AREA.

IF THE CONTRACTOR SUSPECTS TOXIC MATERIALS SUCH AS ASBESTOS AND/OR LEAD-BASED PAINT WILL BE AFFECTED AS PART OF THIS PROJECT, THESE SHALL BE IDENTIFIED BEFORE CONSTRUCTION START. IF FEASIBLE OTHERS WILL TEST FOR AND REMOVE THESE MATERIALS PRIOR TO CONSTRUCTION START. IF THESE MATERIALS MUST REMAIN IN PLACE THE CONTRACTOR WILL MINIMIZE THE DISTURBANCE OF SUCH MATERIALS LEAVING THEM ENCAPSULATED. WHERE SUCH MATERIALS CANNOT BE LEFT ENCAPSULATED THE CONTRACTOR SHALL INCLUDE TESTING OF THESE SPECIFIED AREAS AS PART OF THE PROJECT SCOPE. REMOVAL OF THESE MATERIALS IS NOT TO BE INCLUDED IN THE PROJECT SCOPE.

- A. CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER TRADES PRIOR TO INSTALLATION. REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EXACT SIZE AND LOCATION OF EQUIPMENT WHICH IS FURNISHED BY OTHERS AND CONNECTED BY ELECTRICAL.
- B. RECEPTACLES, SWITCHES AND COVERPLATES COLOR SHALL BE SELECTED BY THE ARCHITECT FROM STANDARD COLORS.
- C. VERIFY ALL DOOR SWINGS WITH ARCHITECTURAL DRAWINGS PRIOR TO ROUGHING-IN WALL FOR SWITCHES.
- D. LOCATION OF DISCONNECT SWITCHES, ETC. FOR MECHANICAL EQUIPMENT/ROOM SHALL BE COORDINATED WITH FINAL MECHANICAL EQUIPMENT LOCATION TO PROVIDE NATIONAL ELECTRIC CODE REQUIRED ACCESS SPACE.
- E. FINAL CONNECTION TO ALL MOTORS SHALL BE WITH FLEXIBLE CONDUIT CONNECTION.
- F. ALL EXIT AND EMERGENCY FIXTURES SHALL BE CONNECTED TO LIGHT CIRCUIT AHEAD OF LOCAL SWITCH.
- G. ALL PANELBOARDS, BACKBOARDS, TERMINAL CABINETS, ETC SHALL HAVE CUSTOM ENGRAVED MICARTA NAMEPLATE MECHANICALLY AFFIXED IDENTIFYING SYSTEM.
- H. PROVIDE GREEN GROUND CONDUCTOR IN ALL CIRCUITS - SIZE PER N.E.C.
- I. ALL EXPOSED CONDUITS, BOXES, STRAPS AND HANGERS IN THE CONTRACT AREA WHETHER NEW OR EXISTING THAT ARE PART OF THE ELECTRICAL SYSTEM SHALL BE PAINTED TO MATCH ADJACENT FINISH.
- J. GENERAL CONTRACTOR SHALL FIELD-VERIFY ALL EXISTING CONDITIONS PRIOR TO BEGINNING ANY WORK, AND SHALL IMMEDIATELY NOTIFY THE ARCHITECT OF ANY DISCREPANCIES. FAILURE TO DO SO INDICATES THAT THE CONTRACTOR ACCEPTS THE CONDITIONS AS THEY EXIST, AND SHALL PERFORM THE WORK REQUIRED AS SHOWN AND SPECIFIED.
- K. THE ELECTRICAL CONTRACTOR SHALL OBTAIN AND REVIEW THE MECHANICAL AND SPECIAL EQUIPMENT SUBMITTALS PRIOR TO SUBMITTING THE ELECTRICAL SUBMITTALS. ANY ELECTRICAL EQUIPMENT, CONDUIT, AND WIRE SIZE CHANGES RESULTING FROM THIS REVIEW SHALL ALSO BE SUBMITTED FOR APPROVAL.
- L. THE ELECTRICAL CONTRACTOR SHALL PROVIDE FAULT CURRENT CALCULATIONS FOR THE SERVICE EQUIPMENT AND SHALL MARK THE EQUIPMENT WITH THE AVAILABLE FAULT CURRENT AND DATE OF THE CALCULATION PER NEC 110.24. REFER TO TYPICAL SERVICE EQUIPMENT FAULT CURRENT LABEL DETAIL.
- M. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ARC FAULT LABELS PER NFPA 70E ARTICLE 110.16 FOR NEW EQUIPMENT. THE OWNER SHALL PROVIDE AVAILABLE CALCULATION DATA FOR THE EXISTING EQUIPMENT IN THE ELECTRICAL SYSTEM. REFER TO TYPICAL ARC FLASH HAZARD LABEL DETAIL.
- N. PROVIDE NEUTRAL AT ALL LINE VOLTAGE SWITCH LOCATIONS PER N.E.C. 404.2(C).
- O. OBTAIN ARCHITECTS APPROVAL OF ALL LIGHT FIXTURES, SWITCHES, RECEPTACLES, PANELBOARDS, ETC. PRIOR TO PURCHASING.
- P. THE ELECTRICAL WORK SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. ALL NOT SO INSTALLED SHALL BE REMOVED AND REPLACED AT NO COST TO THE OWNER.
- Q. ALL WORK SHALL BE INSTALLED IN CONCEALED TYPE CONSTRUCTION. UNDERGROUND CONDUITS UP TO FIRST BOX IN CONCEALED CONSTRUCTION MAY BE SCH.40 PVC. BRANCH CIRCUIT CONDUIT RUN IN OPEN SPACES ABOVE CEILING OR IN WALLS MAY BE THINWALL (E.M.T.) CONDUIT 1/2" MIN. SIZE.
- R. ALL CONDUCTORS LESS THAN 100A. SHALL BE COPPER #12 & #10 SOLID, #8 AND LARGER STRANDED, #6 AND SMALLER TO BE TYPE THW, 600 VOLT INSULATION AND TYPE THW OR THHN FOR #4 AND LARGER. ALUM. CONDUCTORS MAY BE USED FOR 100A. AND LARGER ONLY WHERE USED WITH COMPRESSION TERMINATIONS.
- S. PROVIDE GROUNDING PER NATIONAL ELECTRIC CODE.
- T. THE CONTRACTOR SHALL LEAVE THE ENTIRE ELECTRICAL SYSTEM INSTALLED IN PROPER WORKING ORDER, AND SHALL REPLACE WITHOUT ADDITIONAL COST, ALL WORK OR MATERIAL WHICH MAY DEVELOP DEFECTS, (ORDINARY WEAR AND TEAR OR DAMAGE RESULTING FROM IMPROPER HANDLING EXCEPTED) WITHIN A PERIOD OF ONE (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE BY THE OWNER.
- U. PROVIDE 'LSI' TRIP UNITS FOR ALL BREAKERS GREATER THAN OR EQUAL TO 200A.
- V. PROVIDE BUSHINGS ON ALL CONDUIT.

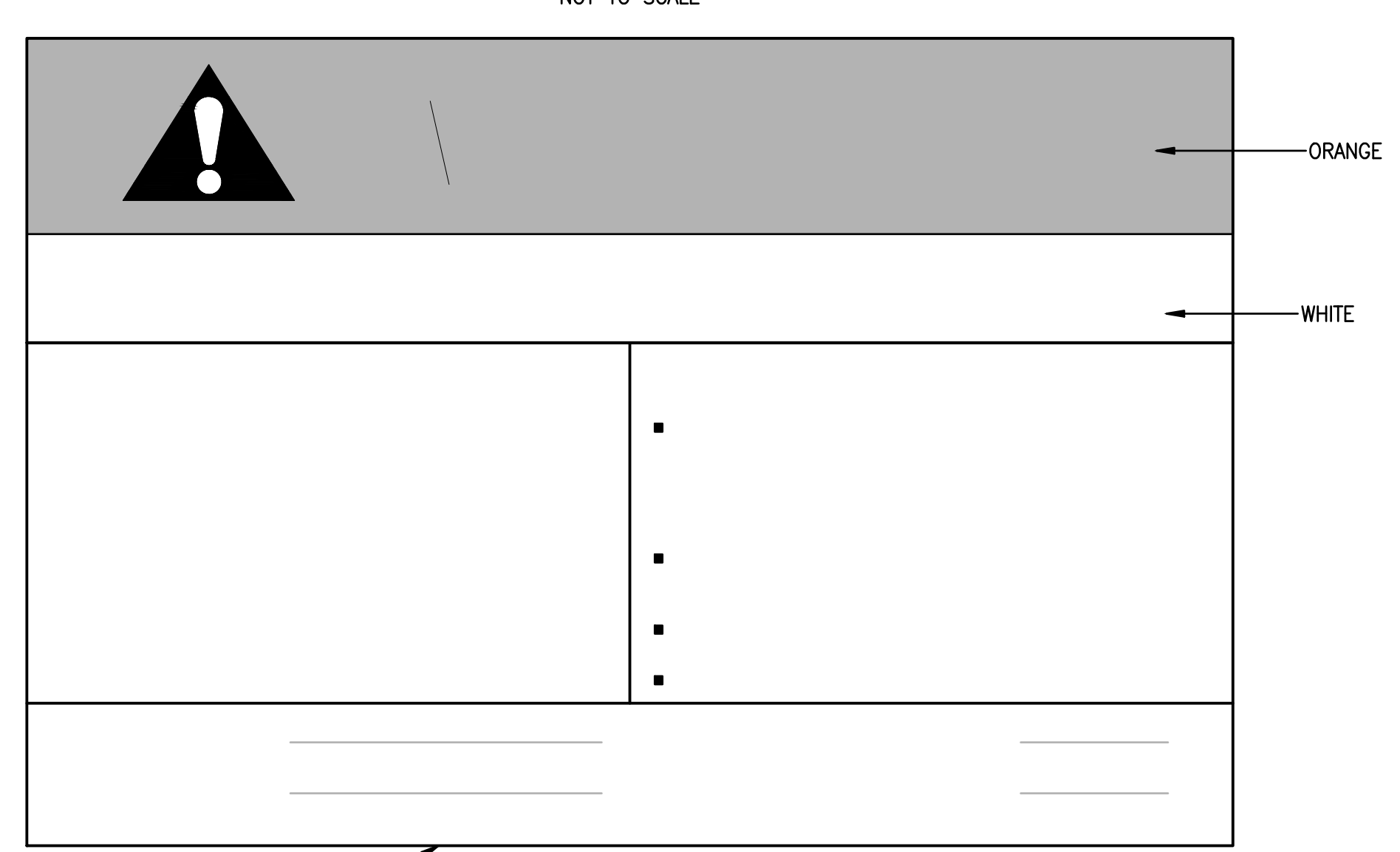


- 1. PLANNED INTERRUPTIONS OF UTILITY SERVICE TO ANY FACILITY OR AREAS WITHIN ANY FACILITY AFFECTED BY THIS CONTRACT, SHALL BE CAREFULLY PLANNED AND COORDINATED WITH THE FACILITY PERSONNEL IN ADVANCE OF THE REQUESTED INTERRUPTION. THE CONTRACTOR SHALL NOT INTERRUPT SERVICES UNTIL SPECIFIED APPROVAL HAS BEEN GRANTED. THE REQUEST SHALL INDICATE SERVICES AND AREAS TO BE AFFECTED, DATE AND TIME OF INTERRUPTION AND DURATION OF OUTAGE. REQUEST FOR INTERRUPTION OF SERVICE WILL NOT BE APPROVED UNTIL ALL EQUIPMENT AND MATERIAL REQUIRED FOR THE COMPLETION OF THAT PARTICULAR PHASE OF WORK ARE ON THE JOB SITE.
- 2. ALL DEMOLITION WORK REQUIRED SHALL BE PERFORMED WITH CARE SO AS NOT TO INTERRUPT OTHER EXISTING SERVICES (WATER, GAS, ELECTRICAL, SEWER, SPRINKLERS, ETC.) IF ACCIDENTAL UTILITY INTERRUPTION, DAMAGE, ETC., RESULTS FROM WORK PERFORMED BY THE CONTRACTOR, THE AFFECTED UTILITY OR SERVICE SHALL BE RETURNED TO ITS ORIGINAL CONDITION WITHOUT DELAY, BY AND AT THE EXPENSE OF THE CONTRACTOR, USING SKILLED WORKMEN OF THE TRADE INVOLVED.
- 3. REMOVE ALL OUTLETS, PULL BOXES, JUNCTION BOXES, ETC., AS REQUIRED TO COMPLETELY REMOVE THE ELECTRICAL ITEMS SHOWN FOR DEMOLITION UNLESS NOTED TO REMAIN. DISCONNECT AND REMOVE ALL ELECTRICAL PROVISIONS TO EQUIPMENT BEING REMOVED.
- 4. REMOVE ALL WIRING, CONDUIT, RACEWAYS, OUTLET BOXES, SUPPORTING APPARATUS ETC., AS REQUIRED.
- 5. SYMBOLS SHOWN ARE TYPICAL AND LOCATIONS ARE APPROXIMATE AND ARE NOT INTENDED TO LIMIT THE AMOUNT OF DEMOLITION. COORDINATE WITH EXISTING CONDITIONS AND THESE NOTES AND REMOVE ALL APPLICABLE SYSTEMS AND COMPONENTS CONFLICTING WITH FINISHED DESIGN INTENT.
- 6. EXISTING BRANCH WIRING SHOWN IS DIAGRAMMATICAL ONLY AND IS BASED UPON EXISTING AS-BUILT DRAWINGS AND SURVEYS. COORDINATE WITH ACTUAL EXISTING CONDITIONS FOR NUMBER OF CONDUCTORS PER CONDUIT AND EXACT LOCATIONS OF CONDUIT RUNS AND EQUIPMENT.
- 7. ALL FEEDERS, SYSTEMS, CONTROL WIRING, MISCELLANEOUS AUXILIARY SYSTEMS, ETC., PASSING THROUGH THE AREA OF WORK SHALL BE MAINTAINED AT ALL TIMES, REMAIN IN SERVICE, CONTINUOUS AND UNINTERRUPTED. ANY DAMAGE, DISRUPTION OR DISCONNECTION SHALL BE IMMEDIATELY REPAIRED, REPLACED AND/OR REROUTED AS REQUIRED TO MAINTAIN CONTINUITY OF SYSTEMS. ANY EXISTING SERVICE OR OPERATING SYSTEM WHICH MUST BE INTERRUPTED SHALL BE SUPPLIED WITH A TEMPORARY SERVICE FOR CONTINUATION OF THE NORMAL OPERATIONS OF THE FACILITY.
- 8. ANY EQUIPMENT THAT REQUIRES REMOVAL FROM EXISTING LOCATION FOR RE-USE OR TO BE RETURNED TO OWNER SHALL BE INSPECTED AND TESTED TO CONFIRM EQUIPMENT OPERATES AS INTENDED. OWNER SHALL BE NOTIFIED OF ANY EQUIPMENT THAT DOES NOT OPERATE AS INTENDED BEFORE REMOVAL.
- 9. CONCEALED CONDUIT THAT CANNOT BE REMOVED DUE TO INACCESSIBILITY MAY BE ABANDONED. CONDUCTORS SHALL BE REMOVED AND CONDUIT CUT FLUSH WITH SURFACE.
- 10. OUTLET BOXES THAT CANNOT BE REMOVED DUE TO FLUSH MOUNTING IN PARTITIONS SHALL BE FILLED WITH GROUT, PATCHED AND FINISHED FLUSH TO MATCH EXISTING WALL CONDITIONS.
- 11. IN GENERAL, THE WORK SHALL INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING:
 - a. PROVIDE ALL DEMOLITION AS REQUIRED OF EXISTING SYSTEMS REMOVING ALL ITEMS THAT CONFLICT WITH FINISHED DESIGN INTENT AS INDICATED ABOVE.
 - b. MODIFY, REPLACE, REPAIR, REVISE ETC., EXISTING SYSTEMS AND/OR EQUIPMENT.
 - c. EXTEND EXISTING SYSTEMS AS REQUIRED TO FUNCTION AS SPECIFIED AND IN ACCORDANCE WITH SYSTEM REQUIREMENTS.
 - d. NEW SYSTEM COMPONENTS SHALL MATCH EXISTING SYSTEMS PROVISIONS AND BE COMPLETELY COMPATIBLE AND IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS. WHEN REQUIRED, APPROVAL FROM A SYSTEM MANUFACTURER SHALL BE OBTAINED BY THE CONTRACTOR PRIOR TO INSTALLING ANY NEW EQUIPMENT OR DEVICES TO AN EXISTING SYSTEM.
 - e. ALL EQUIPMENT, DEVICES, OUTLETS, COMPONENTS, ETC., TO BE REUSED SHALL BE CLEANED, REPAIRED AND PLACED IN OPERATING CONDITION.
 - f. EXISTING OUTLET BOXES MAY BE USED AS NOTED IF OF THE PROPER CONFIGURATION AND SIZE REQUIRED. MODIFICATIONS SHALL BE MADE WHEN REQUIRED SUCH AS PROVIDING EXTENSION RINGS, LOCKNUTS, BUSHINGS, ETC.
 - g. EXISTING PANELBOARDS SHALL BE UTILIZED TO THE EXTENT SHOWN ON THE DRAWINGS AND MODIFIED AS REQUIRED TO FACILITATE THE NEW REQUIREMENTS AS INDICATED HEREIN OR SHOWN ON THE DRAWINGS. NEW CIRCUIT BREAKERS SHALL BE OF THE SAME MANUFACTURER, FRAME SIZE, SHORT CIRCUIT RATING AND TYPE AS EXISTING, WHERE APPLICABLE, THE CONTRACTOR SHALL BE REQUIRED TO FURNISH AND INSTALL ADDITIONAL MOUNTING HARDWARE AS REQUIRED BY THE MANUFACTURER.
 - h. WHEN EXISTING DEVICES, SWITCHES, EQUIPMENT ETC., ARE NOTED TO BE REMOVED AND THE CIRCUIT(S) SERVING SUCH ITEMS SERVES OTHER ITEMS OR DEVICES WHICH ARE TO BE MAINTAINED, THE CONTRACTOR SHALL REROUTE, EXTEND, MODIFY, ETC., EXISTING CIRCUITS AS REQUIRED TO MAINTAIN COMPLETE AND OPERATING SYSTEMS.



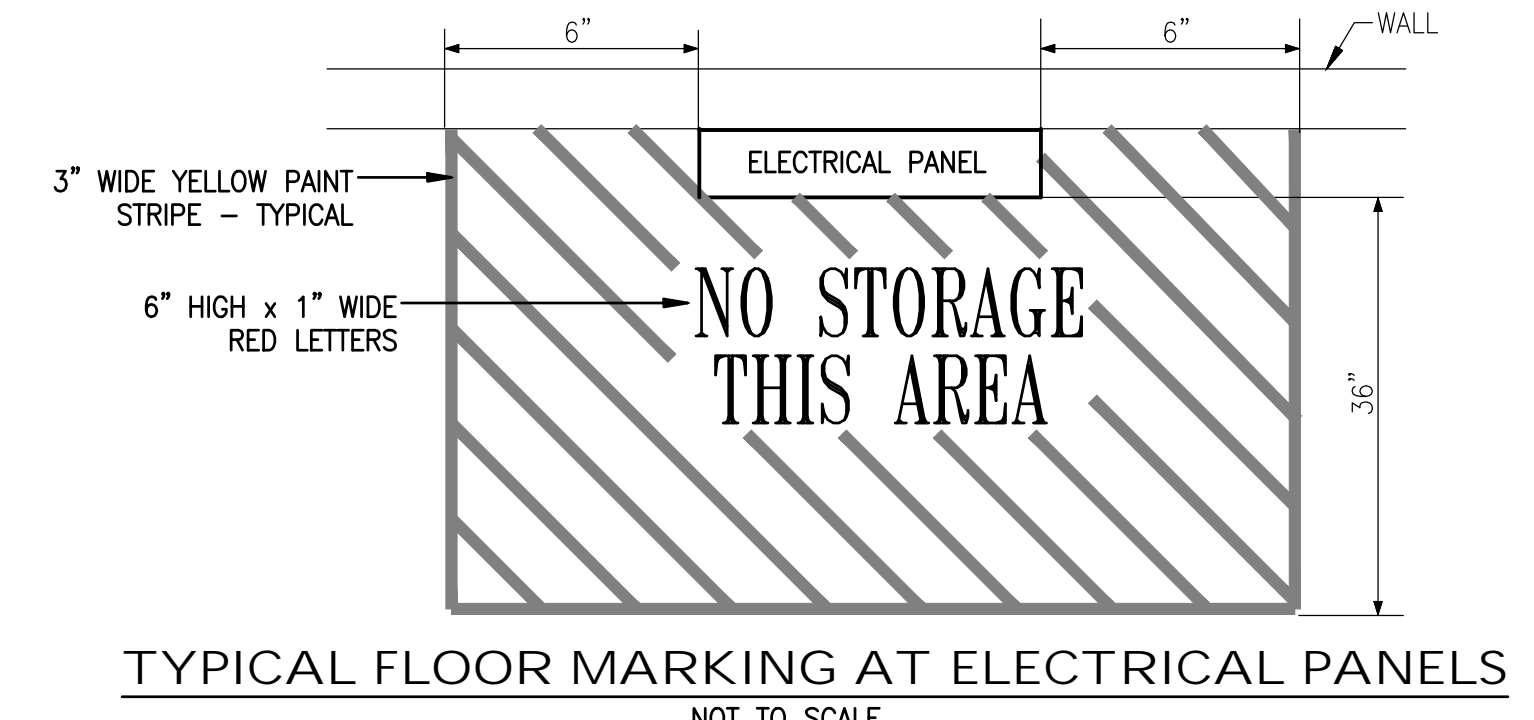
4" H x 6" W VINYL LABEL WITH BLACK LETTERING PER ANSI Z535 STANDARDS.

NOT TO SCALE

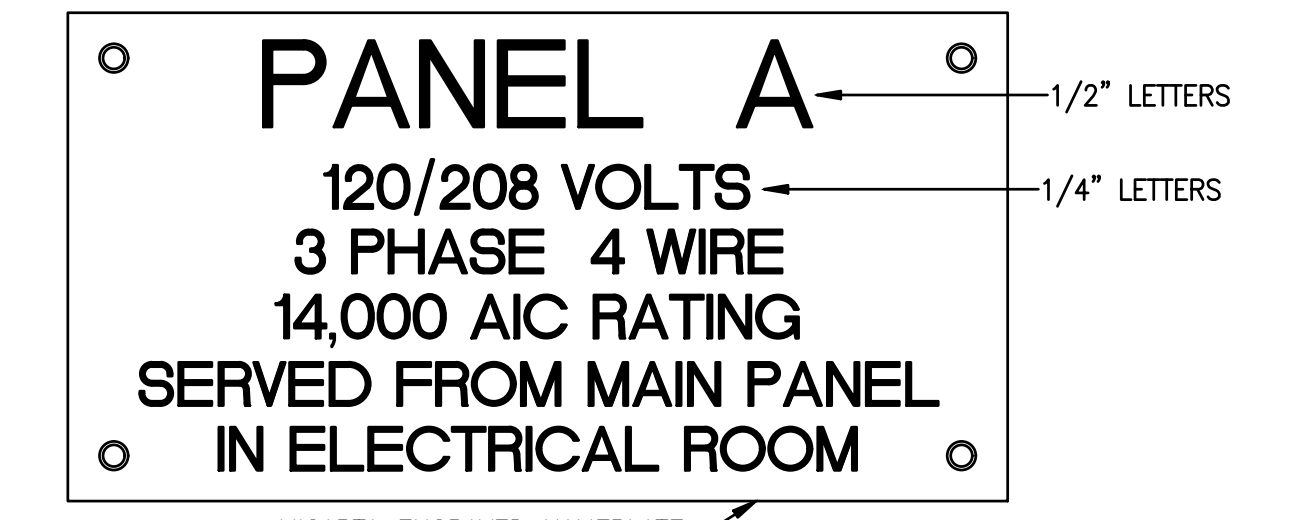


4" H x 6" W VINYL LABEL WITH BLACK LETTERING PER ANSI Z535 STANDARDS.

NOT TO SCALE



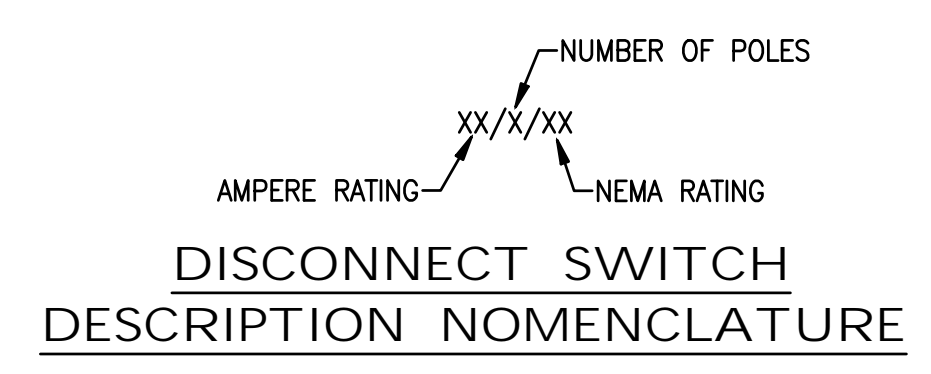
TYPICAL FLOOR MARKING AT ELECTRICAL PANELS NOT TO SCALE



TYPICAL ELECTRICAL EQUIPMENT NAMEPLATE NOT TO SCALE

ABBREVIATIONS

- AFF - ABOVE FINISHED FLOOR
- C - CONDUIT
- C/L - CENTERLINE
- EC - ELECTRICAL CONTRACTOR
- EF - EXHAUST FAN
- GND - GROUND CONDUCTOR
- WH - WATER HEATER
- WP - WEATHERPROOF
- AHU - AIR HANDLING UNIT
- TU - TERMINAL UNIT
- VFD - VARIABLE FREQUENCY DRIVE
- EDH - ELECTRIC DUCT HEATER
- GDH - GAS DUCT HEATER
- SF - SUPPLY FAN



SHEET LIST TABLE	
SHEET REF. NO	SHEET TITLE
E001	LEGEND, NOTES AND DETAILS
E100	SINGLE LINE POWER RISER
E200	HVAC POWER PLAN - SOUTH EXHIBIT LEVEL
E201	HVAC POWER PLAN - NORTH EXHIBIT LEVEL
E202	HVAC POWER PLAN - SOUTH MECH. LEVEL
E203	HVAC POWER PLAN - NORTH MECH. LEVEL
E204	RESTROOM LIGHTING PLANS
E300	PANEL SCHEDULES
E400	PANEL AND MECHANICAL SCHEDULE
ED200	ELECTRICAL DEMOLITION - RESTROOMS

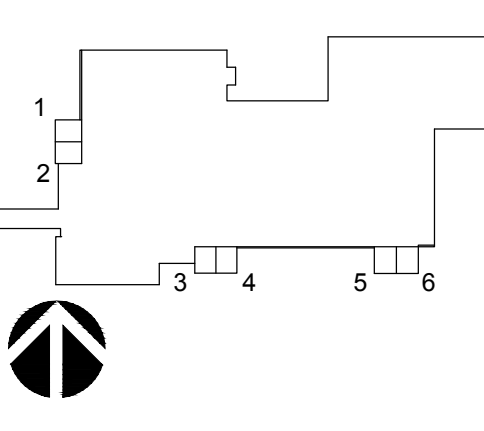


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 TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
 1250 MIRACLE STRIP PKWY SE
 FORT WALTON BEACH, FL 32548



LEGEND, NOTES AND DETAILS

Project number	17057.8
Dated	04-12-21
PIC	SJ
PM	DW
E001	
Scale	As indicated

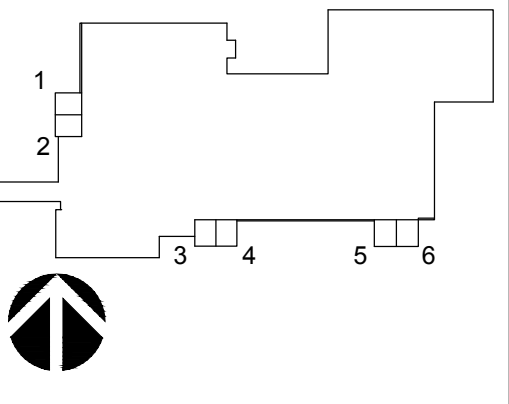


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TASK ORDER NO. 8 & NO. 5 - C-18-2638-TDD
1250 MIRACLE STRIP PKWY SE
FORT WALTON BEACH, FL 32548



REVISIONS:

NO.	DATE	DESCRIPTION

SINGLE LINE
POWER RISER

Project number	17057.8
Dated	04-12-21
PIC	SJ
PM	DW

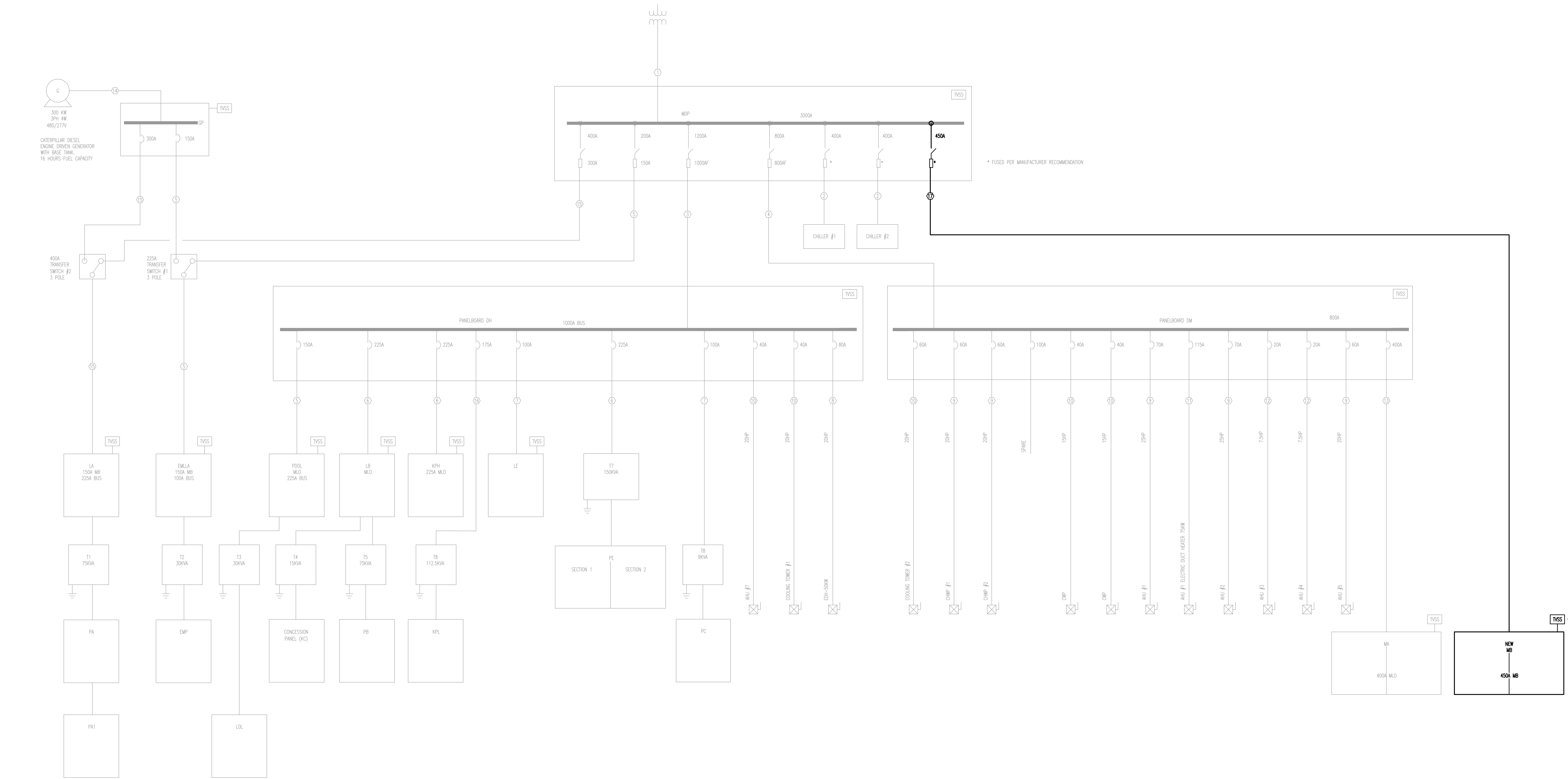
E100

Scale As indicated



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Doreen J. White, FL PE No. 73790

2055
Job No.



EXISTING TRANSFORMER SCHEDULE - DRY TYPE								
KVA	VOLTS	PHASE	PRIMARY			SECONDARY		
			CONDUCTORS	CONDUIT	VOLTS	PHASE	CONDUCTORS	CONDUIT
9	480	3	3#12 & 1#12G	3/4"	120/208	3	4#8 & 1#8G	3/4"
15	480	3	3#10 & 1#10G	3/4"	120/208	3	4#8 & 1#8G	1"
30	480	3	3#6 & 1#10G	1"	120/208	3	4#2 & 1#6G	1-1/2"
45	480	3	3#4 & 1#8G	1-1/4"	120/208	3	4-2/0 & 1#6G	2"
75	480	3	3#2 & 1#6G	1-1/4"	120/208	3	4-300MCM & 1#4G	3"
112.5	480	3	3-2/0 & 1#6G	2"	120/208	3	4-600MCM & 1#3G	4"
150	480	3	3-4/0 & 1#4G	2-1/2"	120/208	3	2 SETS: 4-300MCM & 1#1G	3" EACH SET

SYMBOL	SERVICE AND FEEDERS
①	EXISTING 7 SETS OF 4#600 MCM IN 4" C
②	EXISTING 4#400 MCM & 1#3 GND IN 3" C
③	EXISTING 3 SET OF 4#2/0 IN 3" C
④	EXISTING 2 SETS OF 4#600 MCM & 1#1/0 GND IN 4" C
⑤	EXISTING 4#1/0 & 1#6 GND IN 2" C
⑥	EXISTING 4 #4/0 & 1#4 GND IN 2-1/2" C
⑦	EXISTING 4#3 & 1#8 GND IN 1-1/2" C
⑧	EXISTING 3#4 & 1#8 GND IN 2-1/2" C
⑨	EXISTING 3#8 & 1#10 GND IN 3/4" C
⑩	EXISTING 3#10 & 1#10 GND IN 3/4" C
⑪	EXISTING 3#2 & 1#6 GND IN 1-1/2" C
⑫	EXISTING 3#12 & 1#12 GND IN 3/4" C
⑬	EXISTING 4#500MCM & 1#3 GND IN 4" C
⑭	EXISTING 2 SETS OF 4#250MCM & 1#2 GND IN 3" C
⑮	EXISTING 4#350MCM & 1#3 GND IN 3" C
⑯	EXISTING 4#2/0 & 1#6 GND IN 2" C
⑰	2 SETS OF 4 #4/0 & 1#2 GND IN 2-1/2" C

SINGLE LINE POWER RISER
NOT TO SCALE

*** SPECIAL NOTE ***
PROVIDE 'LSI' TRIP UNITS FOR BREAKERS
GREATER THAN OR EQUAL TO 200A.

NOTES:
① INSTALL SURGE PROTECTIVE DEVICE IN BREAKER POSITION NEAREST TO NEUTRAL BAR WITH 3#10, 1#10 GND IN 3/4" C; LEAD LENGTH CANNOT EXCEED UL 1449 4TH EDITION TEST OF 14" - REFER TO SPECS. PROVIDE INTERNAL 30A FUSING.



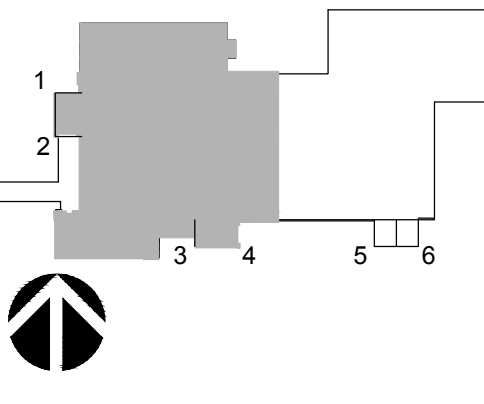
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TASK ORDER NO. 8 & NO. 5 - C-18-2638-TDD
1250 MIRACLE STRIP PKWY SE
FORT WALTON BEACH, FL 32548



REVISIONS:

NO.	DESCRIPTION

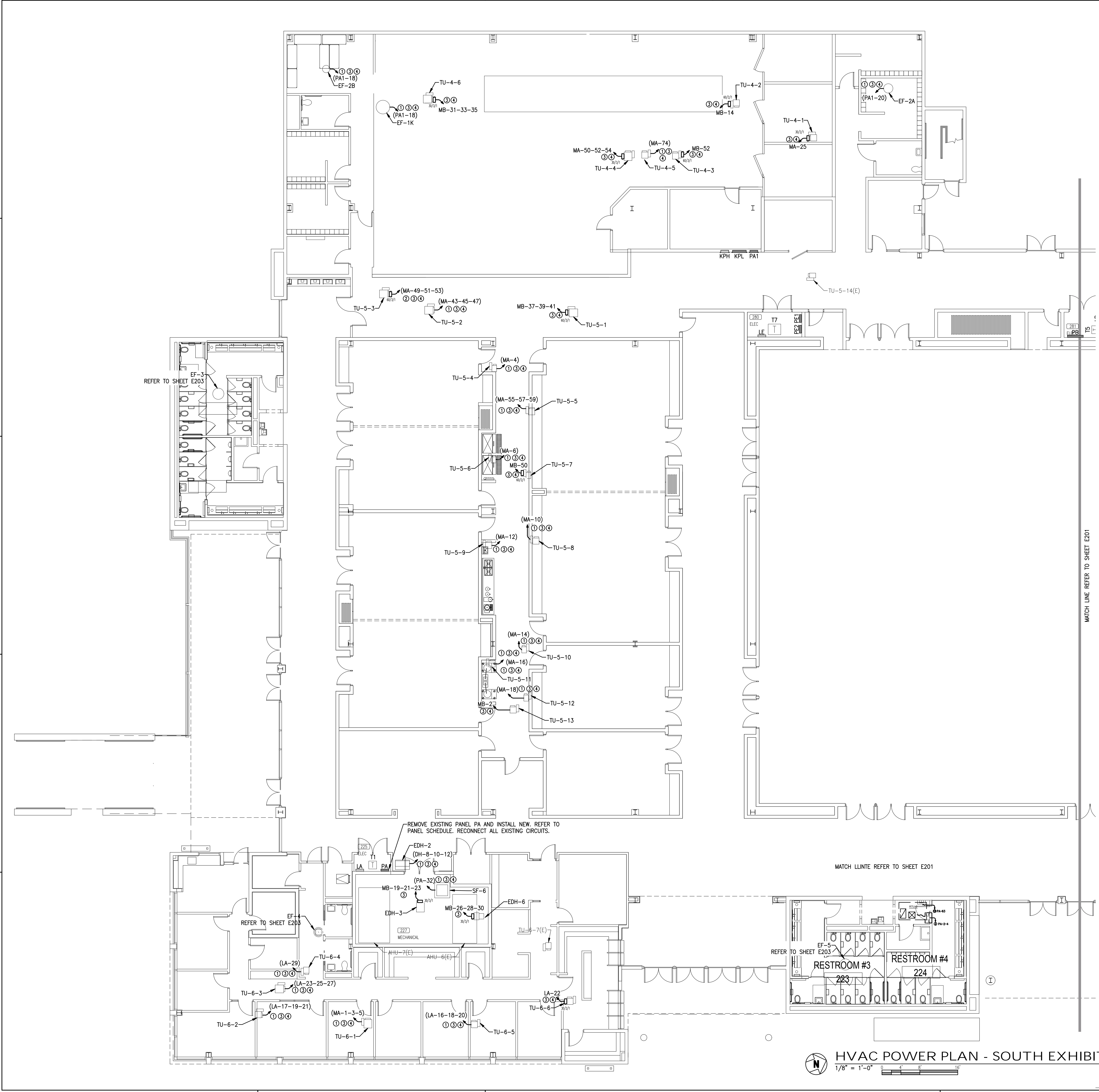
HVAC POWER PLAN - SOUTH EXHIBIT LEVEL

Project number	17057.8
Dated	04-12-21
PIC	SJ
PM	DW

E200

Scale As indicated

- ① CONNECT TO EXISTING DISCONNECT AND CIRCUIT.
- ② CONNECT TO EXISTING CIRCUIT.
- ③ REFER TO MECHANICAL SCHEDULE FOR CONDUIT AND WIRE SIZE.
- ④ DEMOLISH OR DISCONNECT EXISTING ELECTRICAL CONNECTION FOR MECHANICAL EQUIPMENT TO BE REPLACED, AND PREPARE FOR CONNECTION TO NEW EQUIPMENT

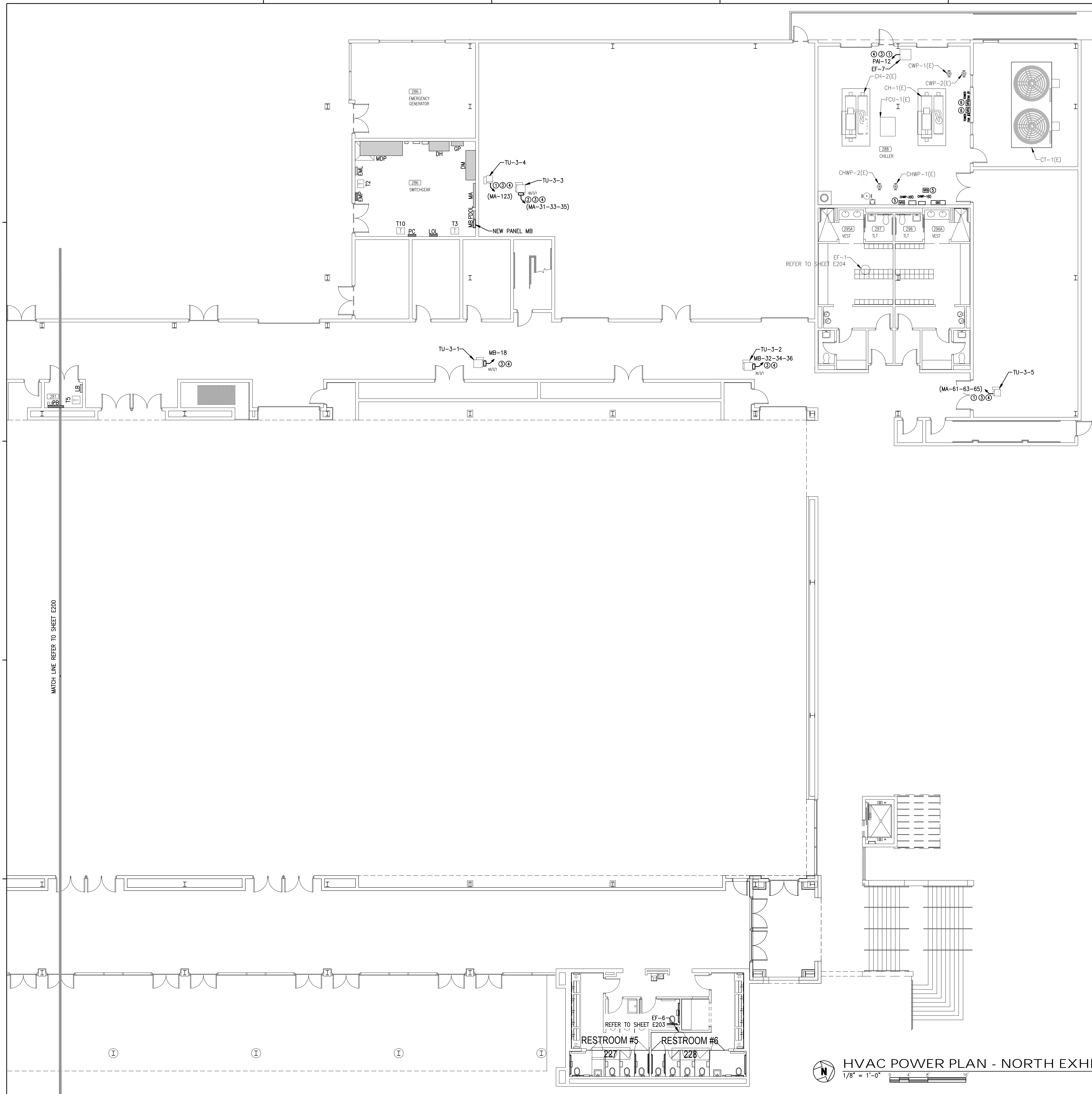


HVAC POWER PLAN - SOUTH EXHIBIT LEVEL
1/8" = 1'-0"



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Job No.



- ① CONNECT TO EXISTING DISCONNECT AND CIRCUIT.
- ② CONNECT TO EXISTING CIRCUIT.
- ③ REFER TO MECHANICAL SCHEDULE FOR CONDUIT AND WIRE SIZE.
- ④ DEMOLISH OR DISCONNECT EXISTING ELECTRICAL CONNECTION FOR MECHANICAL EQUIPMENT TO BE REPLACED, AND PREPARE FOR CONNECTION TO NEW EQUIPMENT.
- ⑤ CONNECT NEW VFDS FOR CHILLED WATER PUMPS. REFER TO MECHANICAL.
- ⑥ CONNECT NEW MOTORIZED DAMPERS. REFER TO MECHANICAL.



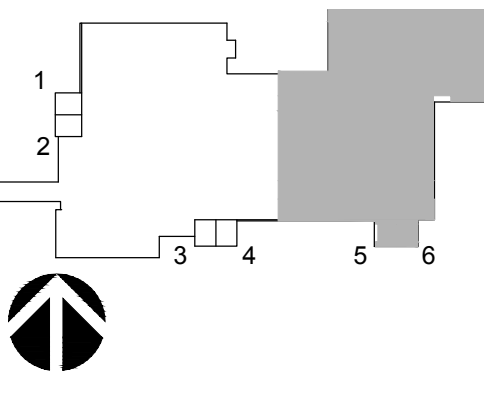
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TASK ORDER NO. 8 & NO. 5 - C-18-2638-TDD
 1250 MIRACLE STRIP PKWY SE
 FORT WALTON BEACH, FL 32548



REVISIONS:

NO.	DATE	DESCRIPTION

HVAC POWER PLAN - NORTH EXHIBIT LEVEL

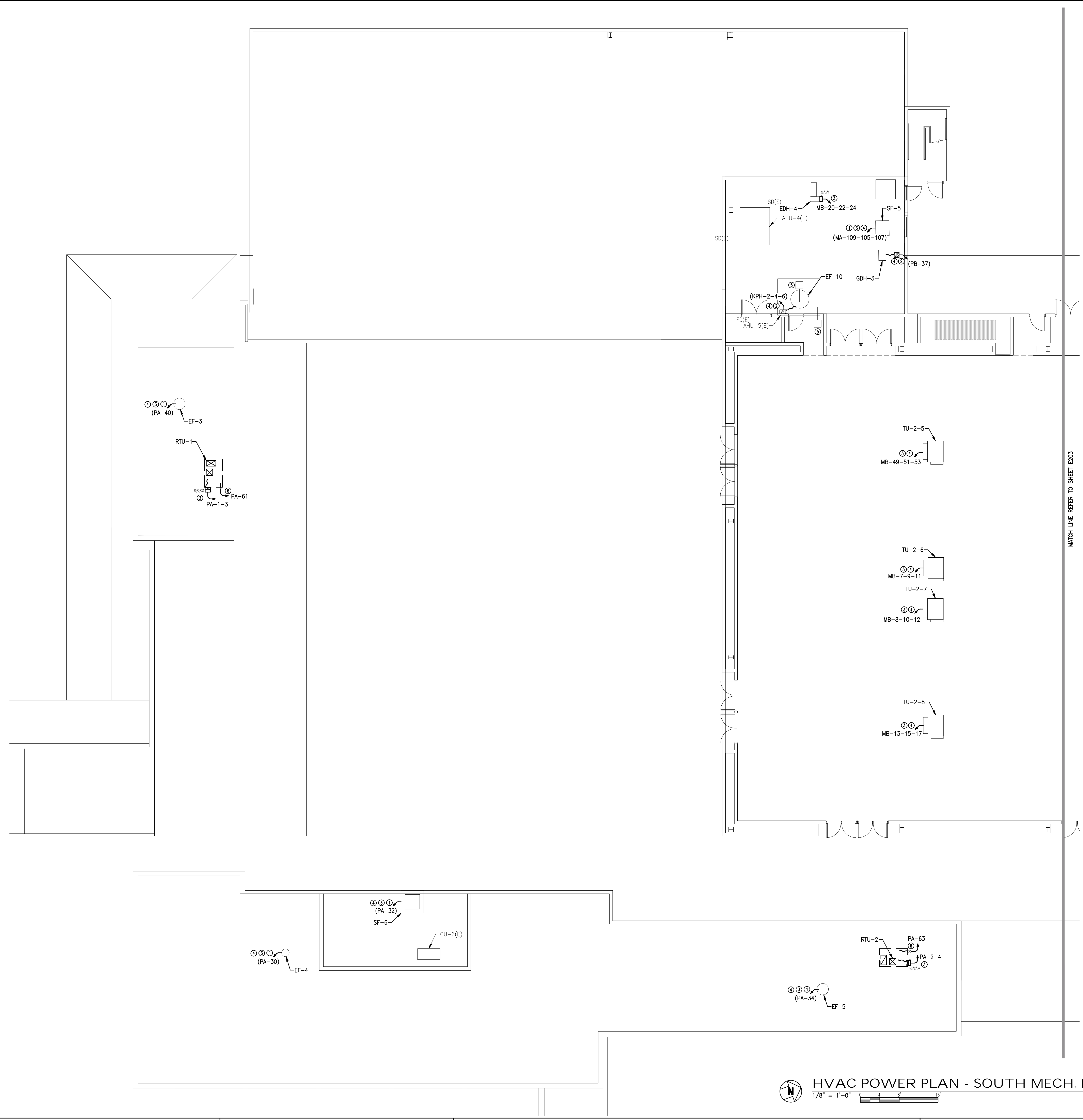
Project number	17057.8
Dated	04-12-21
PIC	SJ
PM	DW

E201
 Scale As indicated

HVAC POWER PLAN - NORTH EXHIBIT LEVEL
 1/8" = 1'-0"

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 Job No.



- NOTES**
- ① CONNECT TO EXISTING DISCONNECT AND CIRCUIT.
 - ② CONNECT TO EXISTING CIRCUIT.
 - ③ REFER TO MECHANICAL SCHEDULE FOR CONDUIT AND WIRE SIZE.
 - ④ DEMOLISH OR DISCONNECT EXISTING ELECTRICAL CONNECTION FOR MECHANICAL EQUIPMENT TO BE REPLACED, AND PREPARE FOR CONNECTION TO NEW EQUIPMENT
 - ⑤ EXISTING MOTORIZED SMOKE DAMPER TO REMAIN.
 - ⑥ CONNECT TO ULTRAVIOLET LAMPS IN RTU.



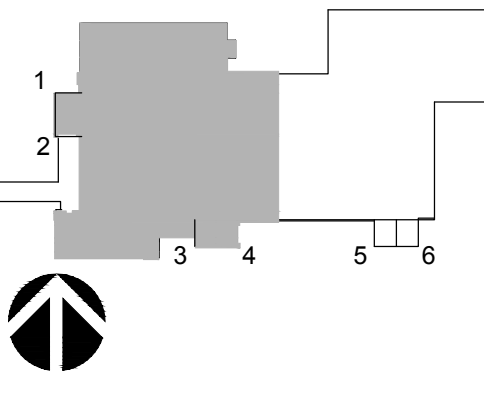
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TASK ORDER NO. 8 & NO. 5 - C18-2638-TDD
1250 MIRACLE STRIP PKWY SE
FORT WALTON BEACH, FL 32548



REVISIONS:

NO.	DESCRIPTION

HVAC POWER PLAN - SOUTH MECH. LEVEL

Project number	17057.8
Dated	04-12-21
PIC	SJ
PM	DW
E202	
Scale	As indicated

HVAC POWER PLAN - SOUTH MECH. LEVEL
1/8" = 1'-0"

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2055
Job No.

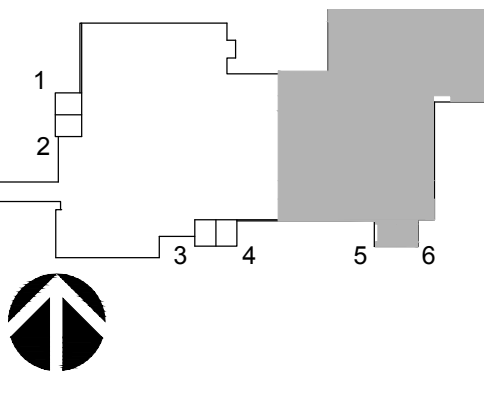


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1250 MIRACLE STRIP PKWY SE
FORT WALTON BEACH, FL 32548



REVISIONS:

NO.	DESCRIPTION	DATE

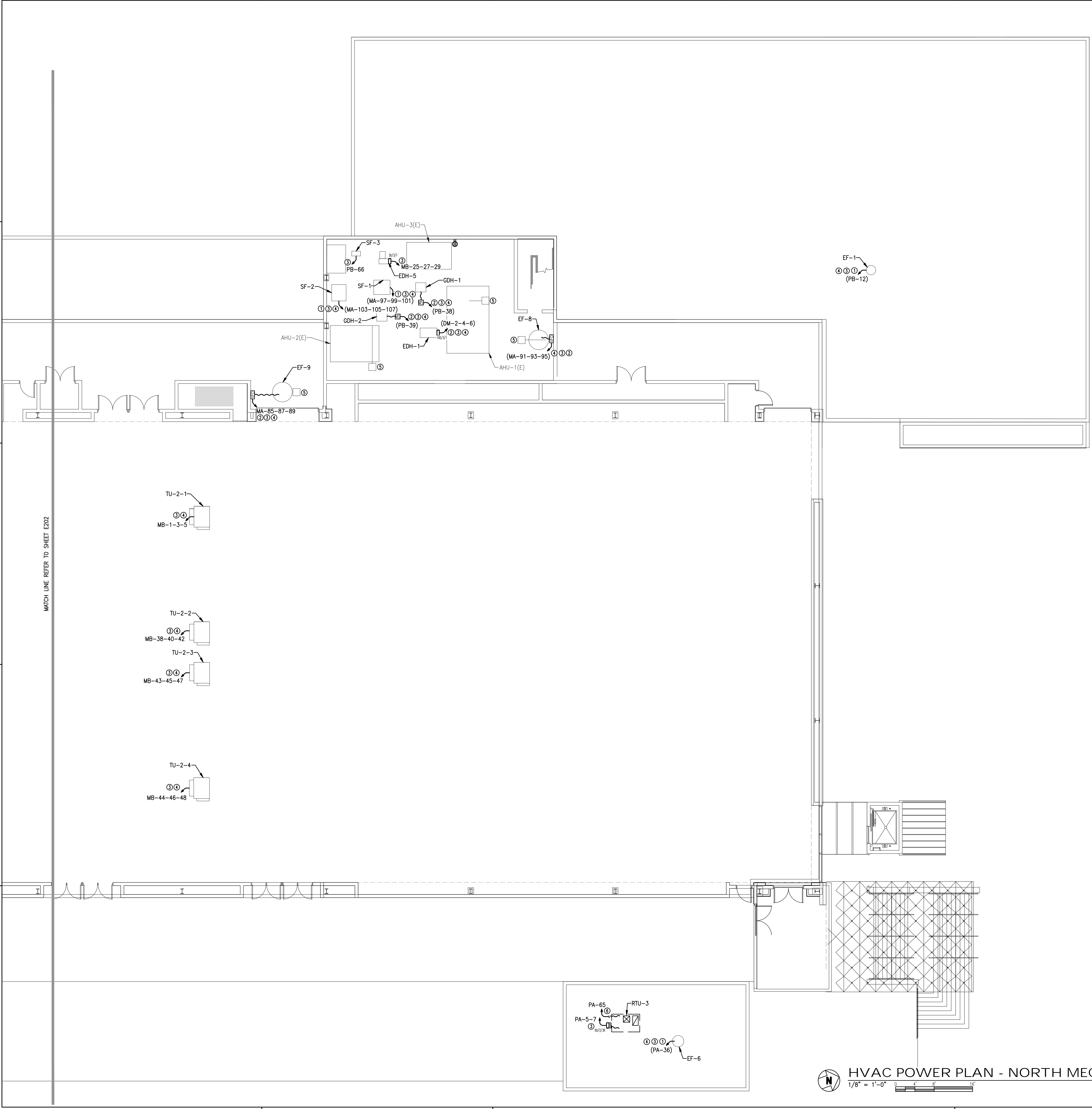
HVAC POWER PLAN - NORTH MECH. LEVEL

Project number	17057.8
Dated	04-12-21
PIC	SJ
PM	DW

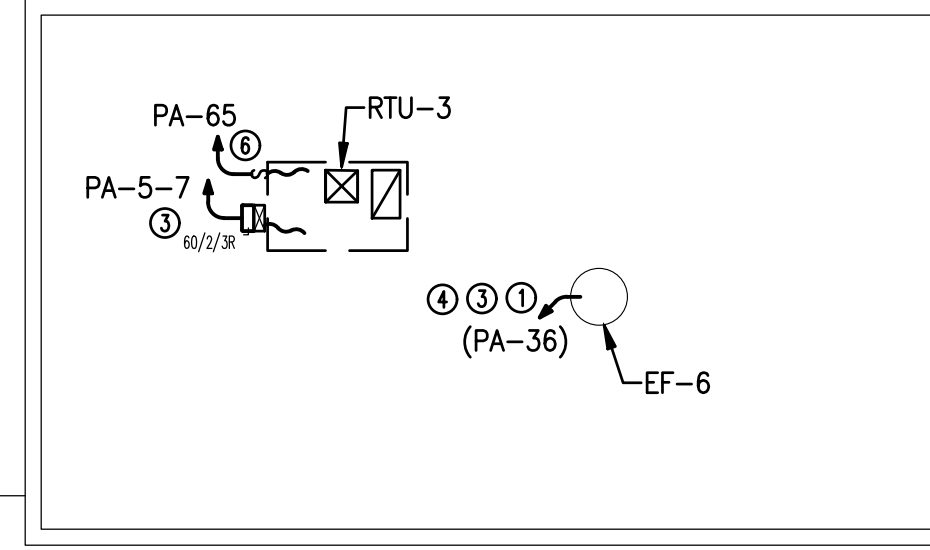
E203

Scale As indicated

- ① CONNECT TO EXISTING DISCONNECT AND CIRCUIT.
- ② CONNECT TO EXISTING CIRCUIT.
- ③ REFER TO MECHANICAL SCHEDULE FOR CONDUIT AND WIRE SIZE.
- ④ DEMOLISH OR DISCONNECT EXISTING ELECTRICAL CONNECTION FOR MECHANICAL EQUIPMENT TO BE REPLACED, AND PREPARE FOR CONNECTION TO NEW EQUIPMENT
- ⑤ EXISTING MOTORIZED SMOKE DAMPER TO REMAIN.
- ⑥ CONNECT TO ULTRAVIOLET LAMPS IN RTU.



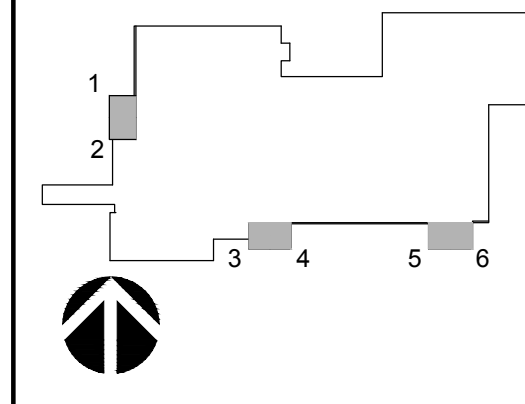
MATCH LINE REFER TO SHEET E202



HVAC POWER PLAN - NORTH MECH. LEVEL
1/8" = 1'-0"

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2055
Job No.



REVISIONS:

RESTROOM LIGHTING PLANS

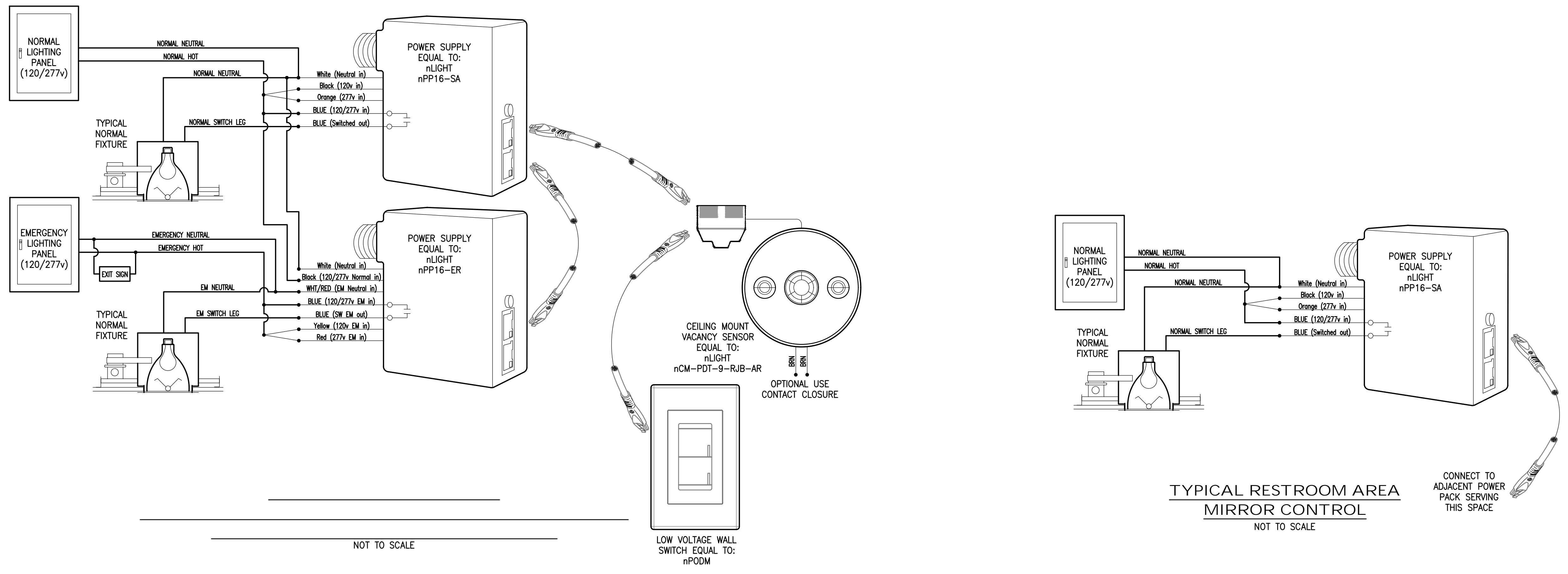
Project number	17057.8
Dated	04-12-21
PIC	SJ
PM	DW

E204

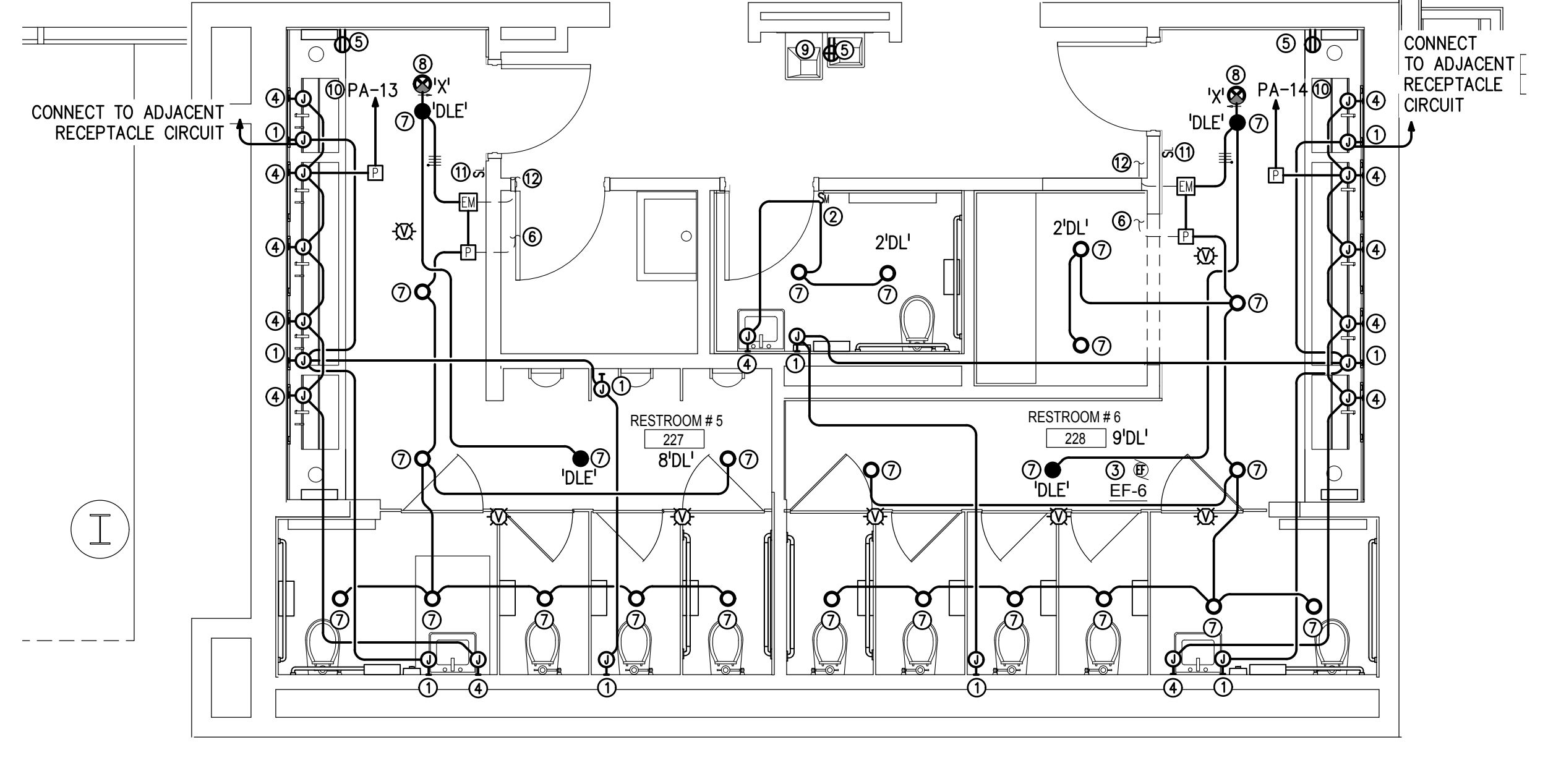
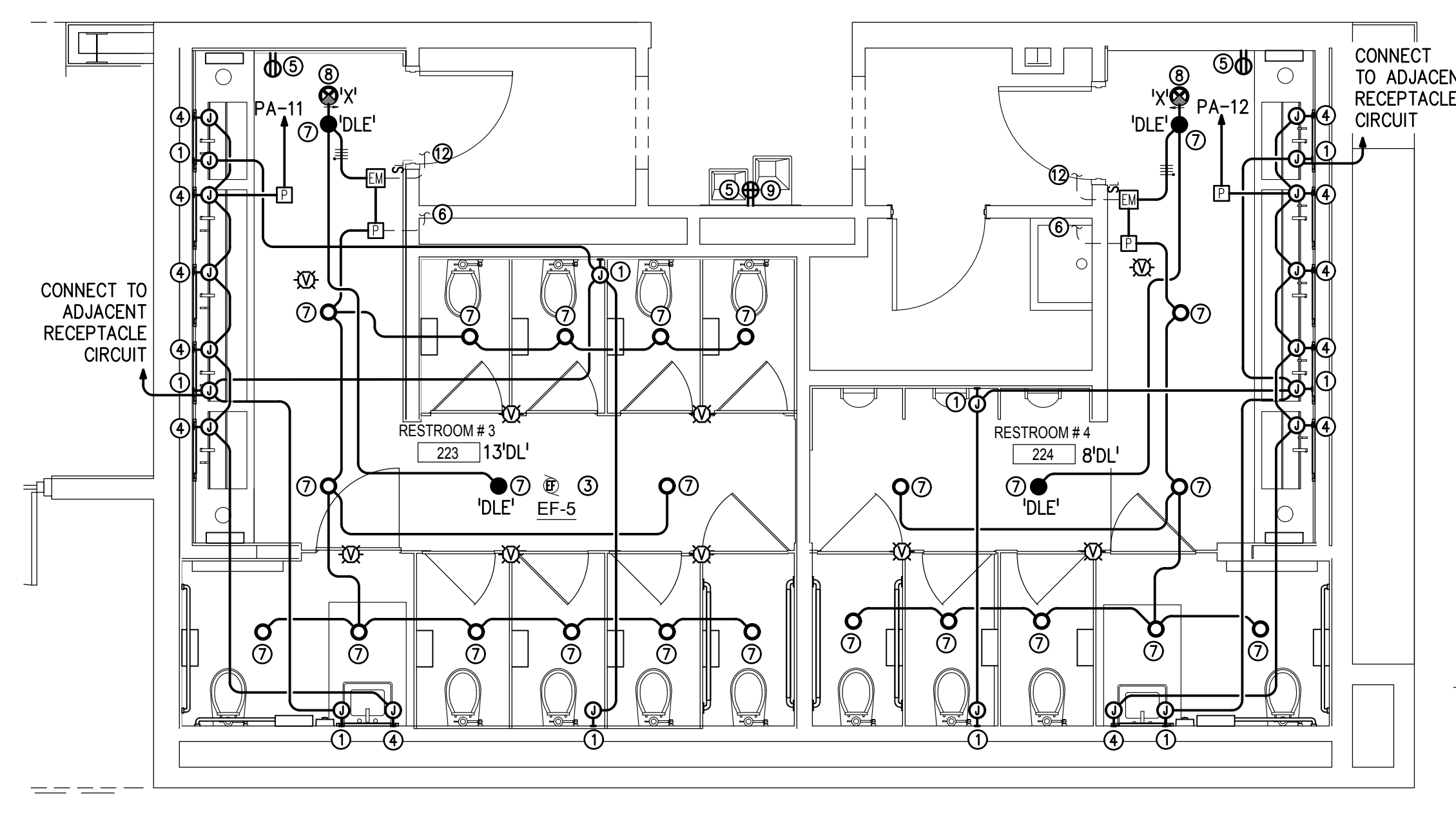
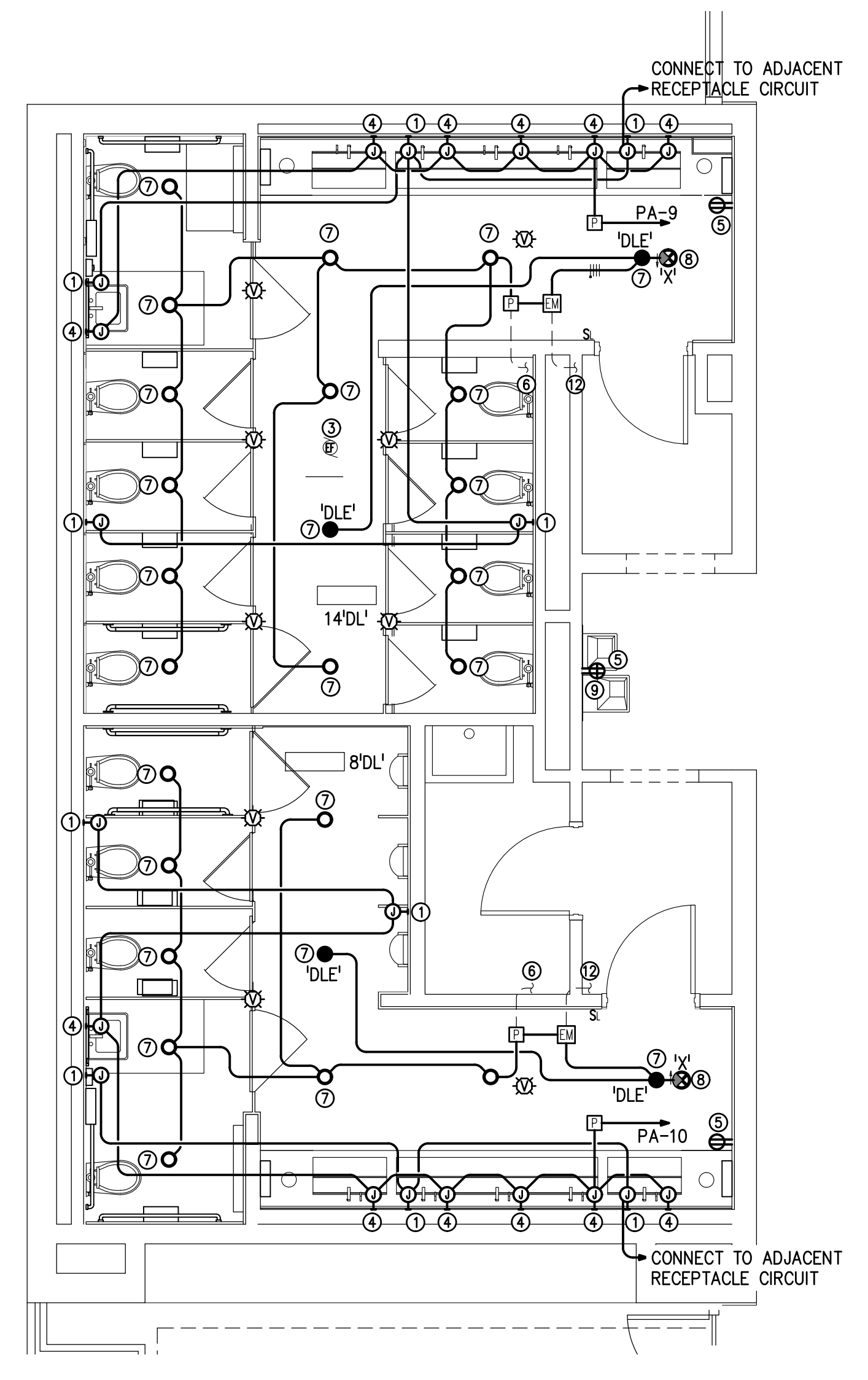
Scale As indicated

- ① PROVIDE 120V POWER TO TOUCHLESS RESTROOM FIXTURES AND AUTO SOAP DISPENSERS, MULTI-OUTLET POWER SUPPLY/CONVERTER. REFER TO PLUMBING DRAWINGS FOR LOCATIONS AND MOUNTING DETAILS. CONNECT TO NEW PANEL PA AS NOTED.
- ② INSTALL NEW INTEGRAL LINE VOLTAGE OCCUPANCY SENSOR SWITCH EQUAL TO SENSOR SWITCH MODEL WSX-2P-2SA-WH. CONNECT NEW LIGHTED MIRROR TO 120V CIRCUIT SERVING THIS SPACE AND CONNECT NEW 277V LIGHTING FIXTURES TO EXISTING LIGHTING CIRCUIT SERVING THIS SPACE.
- ③ EXISTING EXHAUST FAN TO REMAIN. VERIFY POWER AND CONTROL REQUIREMENTS WITH MECHANICAL DRAWINGS.
- ④ CONNECT TO NEW LIGHTED MIRROR BEING PROVIDED AND INSTALLED BY OTHERS AND CONNECTED BY ELECTRICAL CONTRACTOR FOR POWER AND CONTROL.
- ⑤ EXISTING GFCI RECEPTACLE, REPLACE DEVICE AND COVERPLATE WITH NEW DEVICE AND COVERPLATE.
- ⑥ INTERCEPT EXISTING 'NORMAL POWER' LIGHTING CIRCUIT FROM PANEL LA-2 SERVING THIS SPACE AND CONNECT TO NEW POWER PACK AS INDICATED. RECONNECT NEW FIXTURES AT NEW POWER PACK LOCATION.
- ⑦ CONNECT NEW LIGHT FIXTURE TO EXISTING LIGHTING CIRCUIT. MAINTAIN AND VERIFY CIRCUIT CONTINUITY WITH NEW LIGHTING CONTROLS.
- ⑧ NEW EXIT SIGN TO BE CONNECTED TO UNSWITCHED PORTION OF LIGHTING CIRCUIT.
- ⑨ CONNECT NEW WATER COOLER TO EXISTING WATER COOLER CIRCUIT.
- ⑩ 2#10 CU & 1#10 CU GROUND IN 3/4" CONDUIT.
- ⑪ INSTALL NEW LOW VOLTAGE SWITCH IN EXISTING LINE VOLTAGE SWITCH OUTLET BOX. CONNECT LOW VOLTAGE CABLING AS INDICATED ON LIGHTING CONTROLS DETAILS.
- ⑫ INTERCEPT EXISTING 'EMERGENCY POWER' LIGHTING CIRCUIT SERVING THIS SPACE AND CONNECT TO NEW EM RELAY AS INDICATED. RECONNECT NEW EMERGENCY FIXTURES AT NEW EM RELAY LOCATION.

LINETYPE LEGEND
 ——— NEW CONDUCTORS AND CONDUIT AS INDICATED.
 - - - EXISTING CONDUCTOR AND CONDUIT TO BE RE-USED.

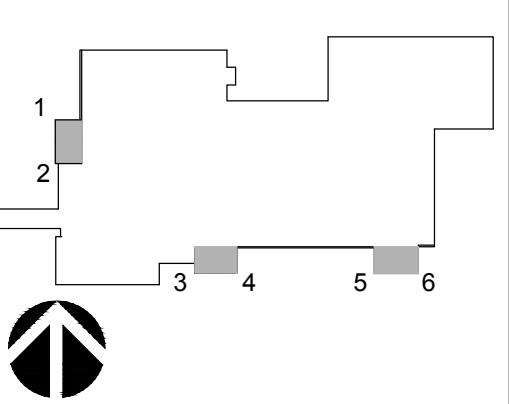


LIGHTING FIXTURE SCHEDULE							
TYPE	MANUFACTURER	CATALOG NUMBER	LAMPS		MOUNTING	DESCRIPTION	FIXTURE EQUALS
			NO.	TYPE			
'DL'	PRESCOLITE	LC6LED120-6LC	-	25W LED 4000K 80CRI	CEILING RECESSED	6" DIA x 5 3/4" H DOWNLIGHT, OPEN WHITE REFLECTOR, WITH WHITE SELF TRIM, 1800 LUMENS, 120V	OR APPROVED EQUAL
'DLE'	PRESCOLITE	LC6LED120EM6LCLED	-	25W LED 4000K 80CRI	CEILING RECESSED	6" DIA x 5 3/4" H DOWNLIGHT, OPEN WHITE REFLECTOR, WITH WHITE SELF TRIM, 1800 LUMENS, BATTERY PACK WITH INTEGRAL TEST SWITCH AND INDICATOR LIGHT, 120V	OR APPROVED EQUAL
'X'	CHLORIDE	ER45VXL-1-RC (ARROWS AS NOTED)	-	LED ARRAY	CEILING SURFACE	CEILING MOUNTED SINGLE FACE EXIT SIGN, RED LETTERS, CLEAR ACRYLIC LETTER PANEL, 277V, NICKEL-CADMIUM MAINT. FREE BATTERY, TEST SWITCH & READY LIGHT	OR APPROVED EQUAL



NEW WORK - RESTROOMS 3 & 4
1/4" = 1'-0"

NEW WORK - RESTROOMS 5 & 6
1/4" = 1'-0"



REVISIONS:

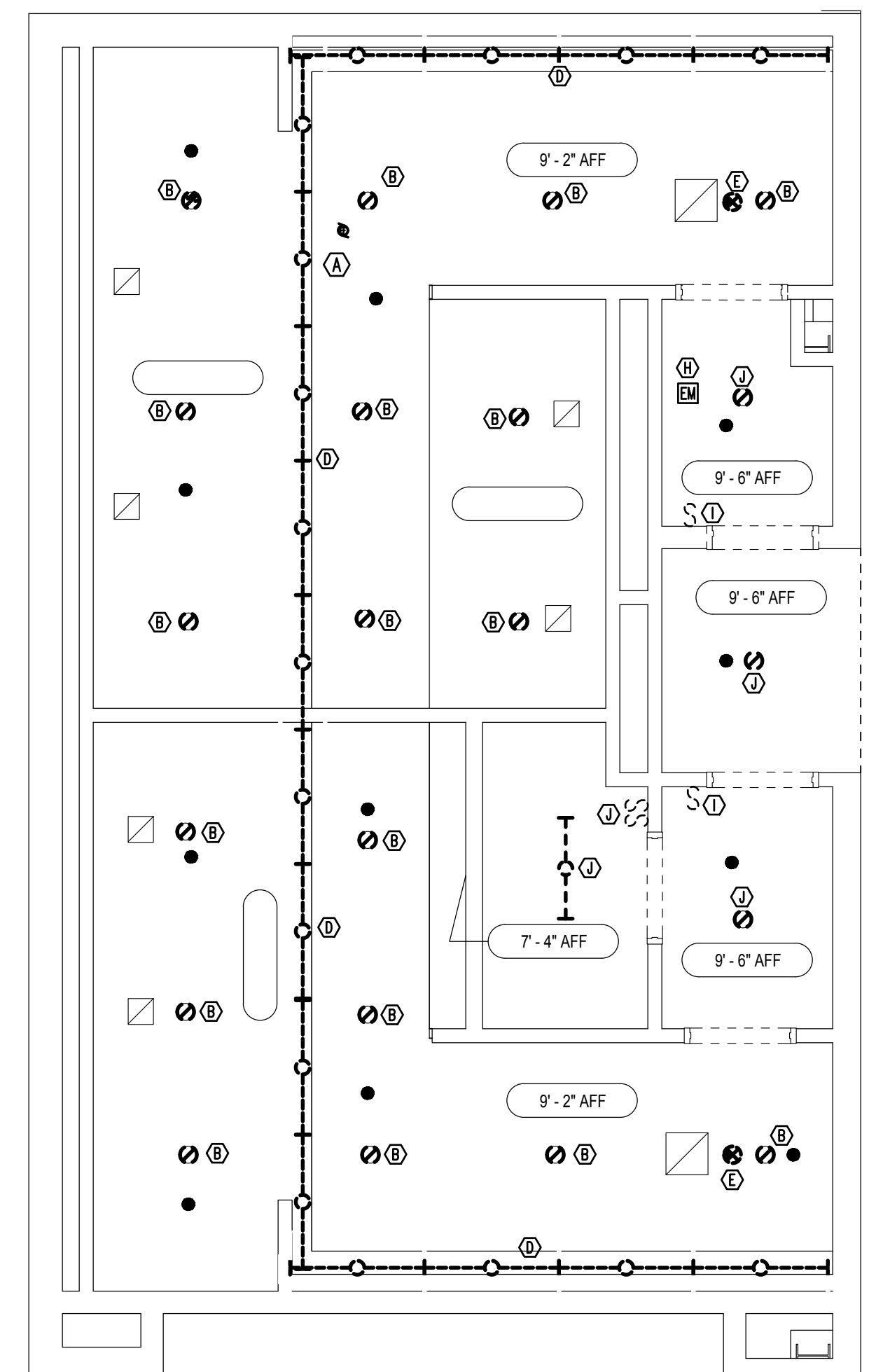
NO.	DATE	DESCRIPTION

ELECTRICAL DEMOLITION - RESTROOMS

Project number	17057.8
Dated	04-12-21
PIC	SJ
PM	DW

ED200

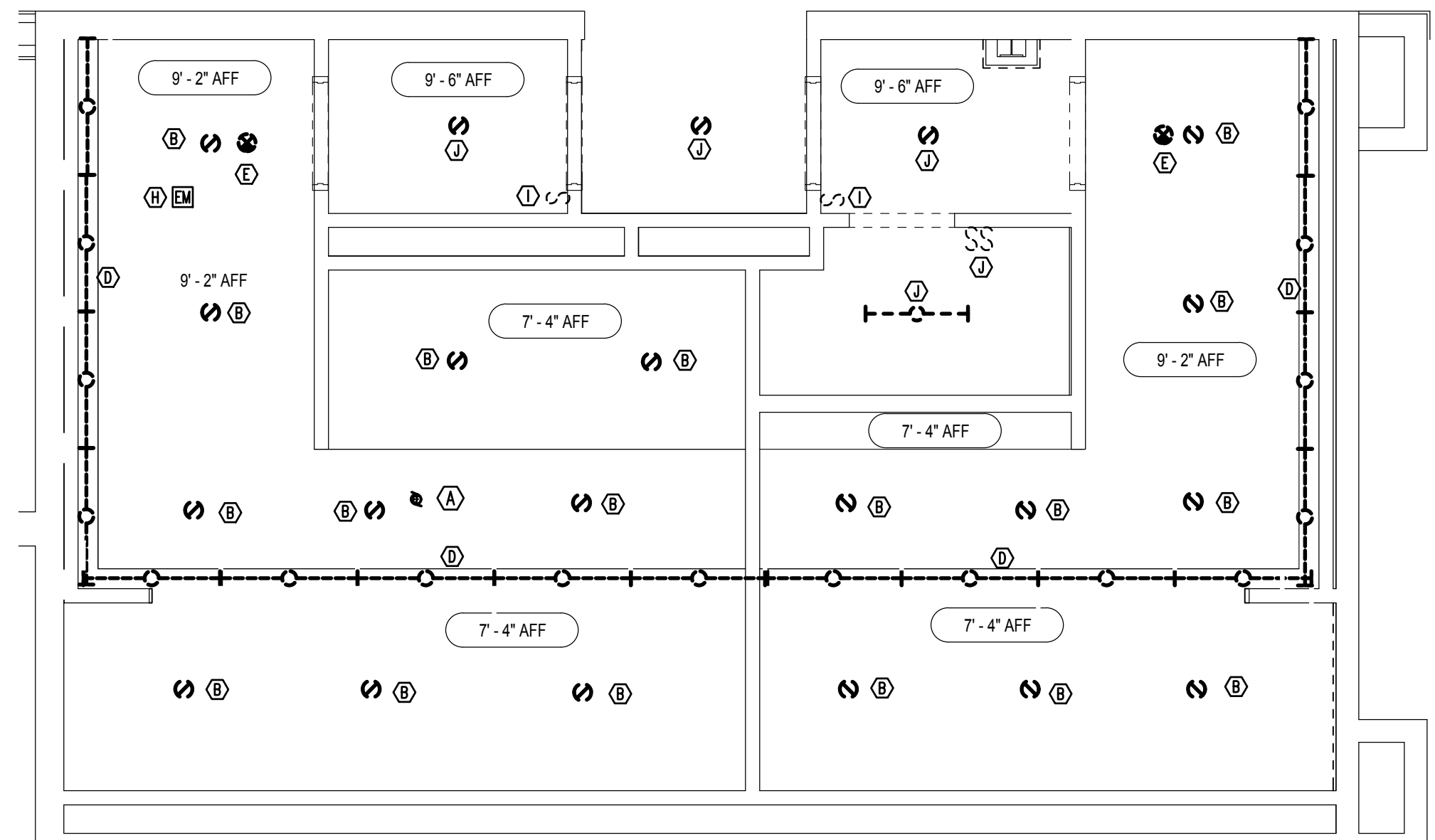
Scale As indicated



ELECTRICAL LIGHTING DEMOLITON

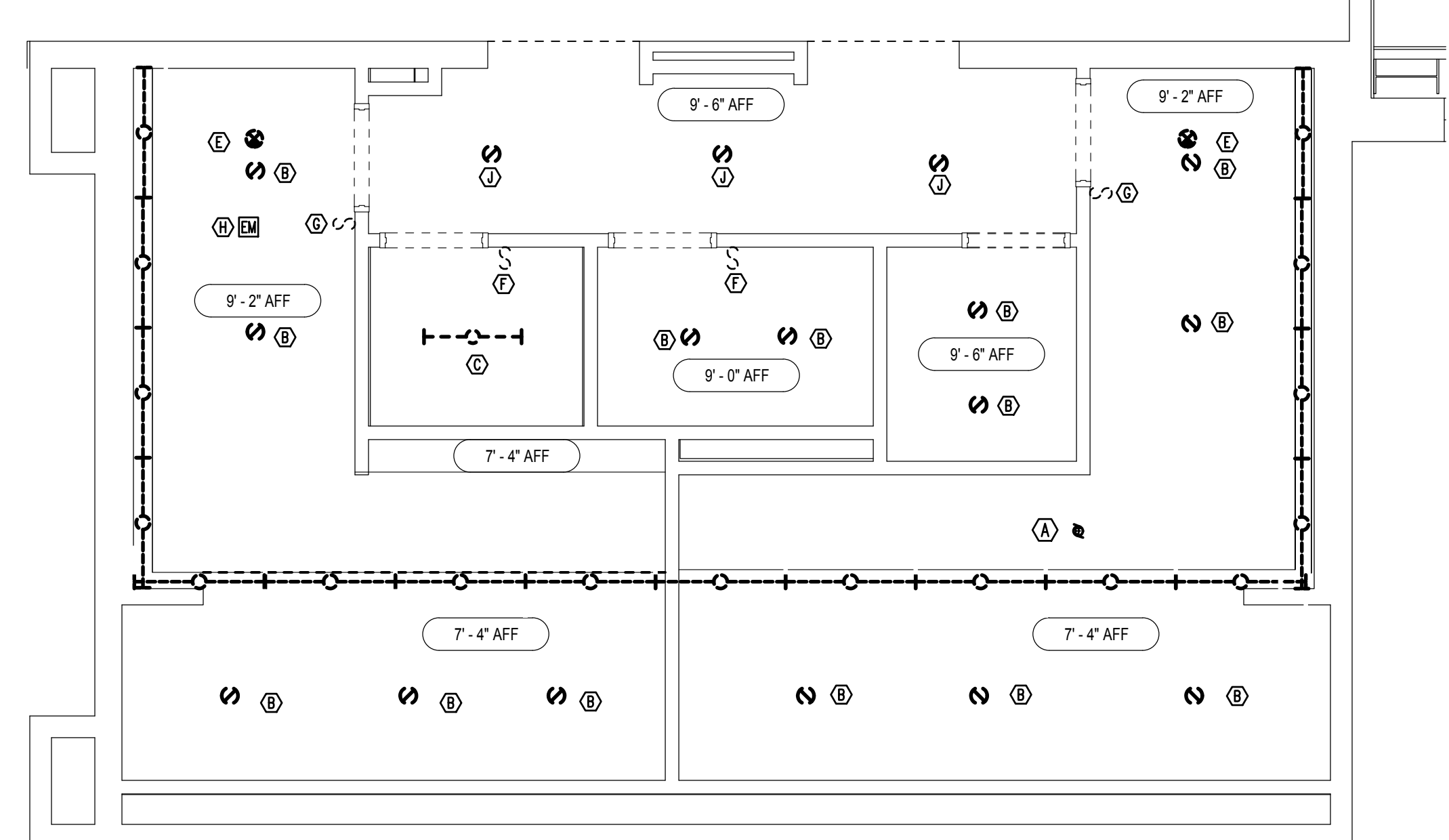
SCALE: 1/4" = 1' - 0"

- ELECTRICAL DEMOLITION NOTES:**
- ① IF REQUIRED DISCONNECT AND RECONNECT EXISTING EXHAUST FAN TO REMAIN. MAINTAIN EXISTING CIRCUIT, VERIFY.
 - ② DISCONNECT AND REMOVE EXISTING RECESSED CAN LIGHT. INSTALL NEW RECESSED CAN LIGHT AND RECONNECT EXISTING CIRCUIT TO NEW RECESSED CAN LIGHT. EXTEND AND/OR MAINTAIN EXISTING CIRCUIT CONTINUITY AS REQUIRED FOR NEW FIXTURE INSTALLATION.
 - ③ DISCONNECT AND REMOVE EXISTING CEILING MOUNTED LIGHT FIXTURE. INSTALL NEW FIXTURE AND RECONNECT EXISTING CIRCUIT, MAINTAIN CIRCUIT CONTINUITY, VERIFY.
 - ④ DISCONNECT AND REMOVE ALL COVE LIGHTS. REMOVE CONDUCTORS BACK TO NEXT ACTIVE LIGHT.
 - ⑤ DISCONNECT AND REMOVE EXISTING EXIT LIGHT. INSTALL NEW EXIT LIGHT AND RECONNECT TO EXISTING CIRCUIT, MAINTAIN CIRCUIT CONTINUITY.
 - ⑥ REMOVE EXISTING SWITCH AND COVERPLATE. REPLACE WITH NEW SWITCH AND COVERPLATE.
 - ⑦ REMOVE EXISTING LINE VOLTAGE SWITCH AND COVERPLATE. REPLACE WITH NEW LOW VOLTAGE SWITCH AND COVERPLATE. REFER TO LIGHTING CONTROLS DETAILS FOR CONNECTION REQUIREMENTS.
 - ⑧ REMOVE EXISTING EMERGENCY LIGHTING RELAY. PREPARE FOR CONNECTION TO NEW EMERGENCY LIGHTING RELAY. REFER TO LIGHTING CONTROLS DETAILS FOR CONNECTION REQUIREMENTS.
 - ⑨ EXISTING SWITCH TO BE REMOVED. REMOVE EXISTING CONDUCTORS BACK TO SOURCE AND INSTALL FINISHED BLANK COVERPLATE.
 - ⑩ EXISTING DEVICE TO REMAIN.



ELECTRICAL LIGHTING DEMOLITON
RESTROOMS #3 & #4

SCALE: 1/4" = 1' - 0"



ELECTRICAL LIGHTING DEMOLITON
RESTROOMS #5 & #6

SCALE: 1/4" = 1' - 0"

ELECTRICAL DEMOLITION - RESTROOMS

1/4" = 1'-0"