

**Marty Stuart's Congress of Country Music – Ellis
Theater Renovations**

MECHANICAL/PLUMBING BID PACKAGE

ADDENDUM NO. 2

TO: All Bidders on the Above Referenced Product
FROM: Dryden Architecture + Design
DATE: October 14, 2021
SUBJECT: **ADDENDUM NO. 2**

ACKNOWLEDGEMENT OF RECEIPT OF ADDENDUM IS REQUIRED ON BID FORM.

Clarifications and revisions to Contract Documents for the referenced project are as follows:

- 1. REPLACE DRAWINGS:** M-001, M-101, M-102, M-103, M-104, M-105, M-201, M-302, M-303, M-305, M-306, M-501, M-502, M-601, M-701 DATED 7/23/21
WITH ATTACHED REVISION NO. 2 DRAWINGS M-001, M-101, M-102, M-103, M-104, M-105, M-201, M-302, M-303, M-305, M-306, M-501, M-502, M-601, M-701 DATED 10/13/21.
(ATTACHED)
- 2. ADD DRAWING:** M-602 (attached)
- 3. REPLACE:** Specification 22 05 00 Common Work Results for Plumbing with Specification 22 05 00.1 (attached)
- 4. ADD:** Specification 22 05 33 Heat Tracing for Plumbing (attached)
- 5. ADD:** Specification 23 75 23 Space Heating Units (attached)

Submitted By:



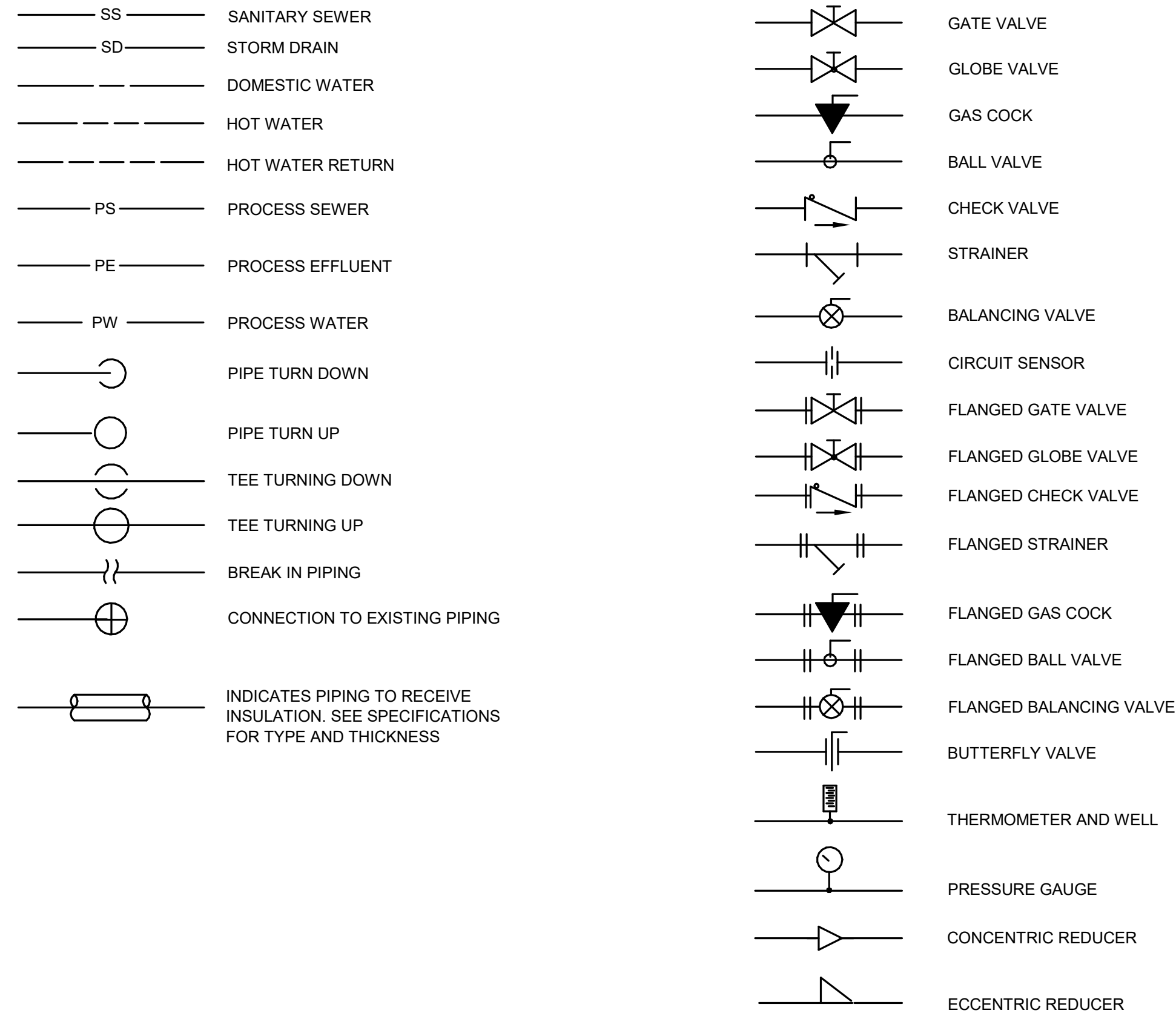
Nick Dryden, AIA

Dryden Architecture + Design

October 14, 2021

**ACKNOWLEDGEMENT OF RECEIPT OF THIS ADDENDUM IS
REQUIRED AND SHALL BE INDICATED ON BID FORM**

LEGEND



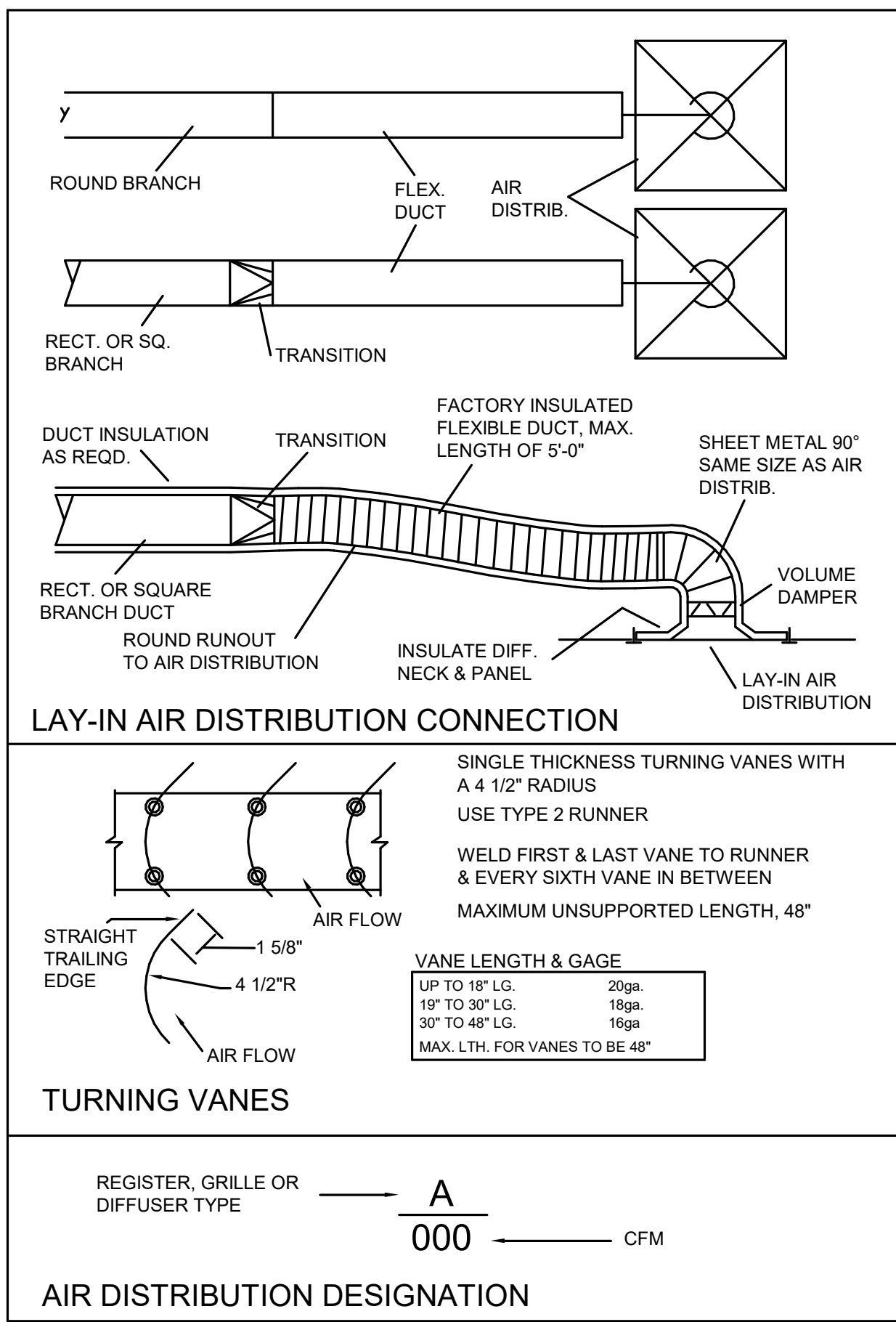
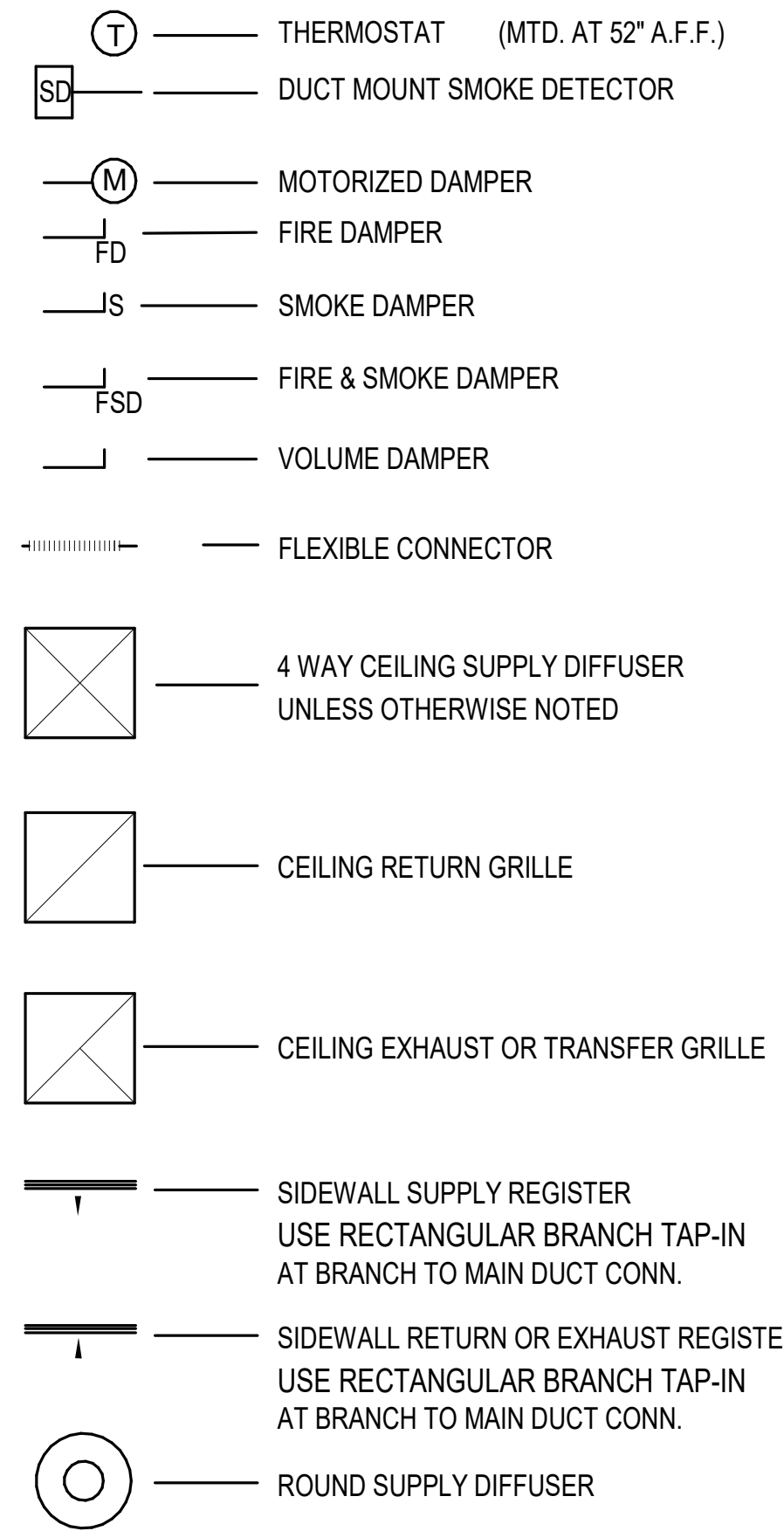
STANDARD ABBREVIATIONS

- A/G - ABOVE GROUND
- ABV - ABOVE
- ACC - AIR COOLED CHILLER
- ACU - AIR CONDITIONING UNIT
- AD - ACCESS DOOR
- AE - AIR EXTRACTOR
- AFF - ABOVE FINISHED FLOOR
- AHU - AIR HANDLING UNIT
- ARU - AIR ROTATION UNIT
- AAV - AIR ADMITTANCE VALVE
- BFVL - BUTTERFLY VALVE, LUGGED TYPE
- BFV - BUTTERFLY VALVE, WAFER TYPE
- BFP - BACKFLOW PREVENTER
- BOP - BOTTOM OF PIPE
- CB - CATCH BASIN
- CH - CHILLER
- CHW - CHILLED WATER
- CHWP - CHILLED WATER PUMP
- CI - CAST IRON
- CT - COOLING TOWER
- CTW - COOLING TOWER WATER
- CU - COPPER
- CV - CONTROL VALVE
- CW - CONDENSER WATER
- CWP - CONDENSER WATER PUMP
- D - DAMPER
- DIP - DUCTILE IRON PIPE
- DWV - DRAIN WASTE VENT
- DCW - DOMESTIC (POTABLE) COLD WATER
- DHW - DOMESTIC (POTABLE) HOT WATER
- EC - ELECTRICAL CONTRACTOR
- EDF - ELECTRIC DRINKING FOUNTAIN
- EDH - ELECTRIC DUCT HEATER
- EF - EXHAUST FAN
- EH - EXHAUST HOOD
- EL - EXHAUST LOUVER
- EUH - ELECTRIC UNIT HEATER
- EWH - ELECTRIC WATER HEATER
- EWSH - EMERGENCY EYE WASH / SHOWER
- FBO - FURNISHED BY OTHERS
- FCO - FLOOR CLEAN OUT
- FCU - FAN COIL UNIT
- FD - FLOOR DRAIN (PLUMBING)
- FD - FIRE DAMPER (MECHANICAL)
- FGCO - FLUSH GRADE CLEAN OUT
- FLG - FLANGE, FLANGED
- FPHB - FROST PROOF HOSE BIBB
- FTU - FAN POWERED VAV TERMINAL UNIT
- FWE - FURNISHED WITH EQUIPMENT
- GC - GENERAL CONTRACTOR
- GDF - GAS DUCT FURNACE
- GDH - GAS DUCT HEATER
- GF - GAS FURNACE
- GWH - GAS WATER HEATER
- GRH - GRAVITY RELIEF HOOD
- H - HUMIDIFIER
- HB - HOSE BIBB
- HW - HEATING WATER
- HWUH - HOT WATER UNIT HEATER
- HX - HEAT EXCHANGER
- IH - INTAKE HOOD
- IL - INTAKE LOUVER
- IRH - INFRARED HEATER
- L - LAVATORY (PLUMBING)
- L - LOUVER (MECHANICAL)
- LPG - LIQUEFIED PETROLEUM GAS
- MC - MECHANICAL CONTRACTOR
- MH - MAN HOLE
- MD - MOTORIZED DAMPER
- NEG - NATIONAL ELECTRICAL CODE
- NG - NATURAL GAS
- NIC - NOT IN CONTRACT
- NRS - NON RISING STEM
- OVS - OIL WATER SEPARATOR
- OSY - OUTSIDE SCREW AND YOKE
- P - PUMP
- PLBG - PLUMBING
- PRDV - PRESSURE REDUCING VALVE
- PRLV - PRESSURE RELIEF VALVE
- PTAC - PACKAGED TERMINAL AIR CONDITIONER
- PTU - PACKAGED TERMINAL UNIT
- PVC - POLYVINYLCHLORIDE
- PW - POTABLE WATER
- RD - ROOF DRAIN
- RL - REFRIGERANT LIQUID LINE
- RS - REFRIGERANT SUCTION LINE
- RTU - ROOF TOP AIR CONDITIONER
- S - SINK
- SA - SHOCK ABSORBER
- SD - SPLITTER DAMPER
- SF - SUPPLY FAN
- SHU - SPACE HEATING UNIT
- SMKD - SMOKE DAMPER
- SS - SERVICE SINK
- SSTL - STAINLESS STEEL
- STL - STEEL
- STM - STEAM
- TOP - TOP OF PIPE
- TOS - TOP OF STEEL
- TWU - THROUGH WALL UNIT
- U - URINAL
- U/G - UNDERGROUND
- UON - UNLESS OTHERWISE NOTED
- UH - UNIT HEATER
- VAL - VALVE
- VAV - VARIABLE AIR VOLUME TERMINAL UNIT
- VD - VOLUME DAMPER
- VT - VENT
- VTR - VENT THROUGH ROOF
- WC - WATER CLOSET
- WCO - WALL CLEAN OUT
- WF - WASH FOUNTAIN
- WH - WATER HEATER

RECTANGULAR FITTING LEGEND

SINGLE LINE DUCT	DESCRIPTION	DOUBLE LINE DUCT
	RECTANGULAR 90° RADIUS ELBOW WITH CENTER LINE RADIUS OF 1.5 x WIDTH	
	RECTANGULAR 45° RADIUS ELBOW WITH CENTER LINE RADIUS OF 1.5 x WIDTH	
	RECTANGULAR 90° SQUARE ELBOW SINGLE THICKNESS VANES	
	BELLMOUTH TAP-IN	
	RECTANGULAR BRANCH TAP-IN	
	RECTANGULAR REDUCER TAPERED EACH SIDE	
	RECTANGULAR REDUCER TAPERED ONE SIDE	
	RECT. TO ROUND TRANSITION	
	RECTANGULAR TEE	
	RECTANGULAR TEE	
	VOLUME DAMPER	

HVAC SYMBOLS



SHEET #	SHEET TITLE	Current Revision	Current Revision Date	Current Revision Description
M-001	MECHANICAL LEGEND	02	10-13-21	REVISED ROOTOP EQUIPMENT, DUCT
M-101	FIRST FLOOR HVAC PLAN	02	10-13-21	REVISED ROOTOP EQUIPMENT, DUCT
M-102	PNC SECOND FLOOR HVAC PLAN	02	10-13-21	REVISED ROOTOP EQUIPMENT, DUCT
M-103	AUDIO BUILDING HVAC PLAN	02	10-13-21	REVISED ROOTOP EQUIPMENT, DUCT
M-104	THEATER ROOF PLAN	02	10-13-21	REVISED ROOTOP EQUIPMENT, DUCT
M-105	AUDIO BUILDING ROOF PLAN	02	10-13-21	REVISED ROOTOP EQUIPMENT, DUCT
M-301	ELEVATIONS	02	10-13-21	REVISED ROOTOP EQUIPMENT, DUCT
M-302	ELEVATIONS	02	10-13-21	REVISED ROOTOP EQUIPMENT, DUCT
M-303	ELEVATIONS	02	10-13-21	REVISED ROOTOP EQUIPMENT, DUCT
M-305	ELEVATIONS	02	10-13-21	REVISED ROOTOP EQUIPMENT, DUCT
M-306	ELEVATIONS	03	10-13-21	RE-ISSUE, NO CHANGES
M-501	DETAILS	03	10-13-21	RE-ISSUE, NO CHANGES
M-502	DETAILS	03	10-13-21	RE-ISSUE, NO CHANGES
M-601	MECHANICAL SCHEDULES	02	10-13-21	REVISED ROOTOP EQUIPMENT, DUCT
M-602	MECHANICAL SCHEDULES	02	10-13-21	REVISED ROOTOP EQUIPMENT, DUCT
M-701	HVAC SEQUENCES OF OPERATION	02	10-13-21	REVISED ROOTOP EQUIPMENT, DUCT

JESCO, Inc.
Construction
MECHANICAL - ELECTRICAL
3000 McCullough Boulevard
Tupelo, MS 38801
662-842-3167 662-841-2338

Dryden

2520 White Avenue
Nashville, TN 37204
615.248.3223
dryden.studio



A New Construction Project: MSCCM - Ellis Theater Renovation

Project Site Address:
311 Byrd Avenue
Philadelphia, MS
39350

DAAD Project Number:
17583

No: 01
SET: CD SET
DATE: 7-23-21

No: 02
REVISOR: REVISOR
DATE: 10-13-21

Drawing:
MECHANICAL LEGEND
M-001

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SECTION 220500 COMMON WORK RESULTS FOR PLUMBING

PART 1 GENERAL

1.1 SUMMARY

- A. Common Work Results for Plumbing Requirements. Work of this Section for the proposed Contract comprises Section 22 Plumbing Work. Section 22 Plumbing Work will herein after be referenced as Work.
- B. Work of this Section is inclusive of Plumbing, Mechanical and Electrical Work of the General Contract Bidder. The name Contractor in Section 22 shall be the Contractor or Sub-Contractor assigned the Work of Section 22.
- C. Contract Documents include the drawings and specifications, which are to be taken together. Work specified and not shown on the drawings or Work shown on the drawings and not specified shall be performed and/or furnished as though mentioned in both specifications and drawings. If there is a discrepancy in the Contract Documents as to the type, quality and quantity of equipment and accessories on which to perform the Work, contact the Architect/Engineer for clarification before proceeding

1.2 QUALITY ASSURANCE

- A. Perform Work in accordance with state, county and municipality codes and standards.

1.3 STANDARD OF CARE

- A. The Engineer has exercised usual and customary professional standard of care to design this project in compliance with applicable laws, regulations, codes, and standards in effect at the date of the design services. Should any part of the Contract Documents be found to be in conflict with applicable codes or ordinances, Contractor shall notify the Architect/Engineer prior to proceeding.
- B. Work shall be executed and inspected in accordance with the requirements of federal, state, and local codes, laws, ordinances, rules, energy codes and regulations, NFPA and OSHA requirements applicable to the particular class of work.

1.4 BUILDING INSPECTION PERMITS

- A. Contractor shall make application to the state and local Building Code Enforcement Officials to obtain inspection permits required and shall pay necessary fees for same.
- B. Contractor shall, at the completion of the installation, secure a Certificate of Inspection, signed by the state and/or local Building Code Enforcement Officials, which shall state that rules have been complied with and that the Work is satisfactory.
- C. At project completion, Contractor shall submit the signed Certificate of Inspection (if available) to the Engineer for delivery to the Owner.

1.5 ACCURACY OF DATA

- A. The drawings are intended as design only and indicate the general scope of Section 22 Work contemplated and do not constitute shop drawings and should not be used as such. Drawings are generally diagrammatic and, except where dimensions are shown, are not intended to show the exact location of pipes, ductwork, outlets, fixtures, or equipment.

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1.6 DESCRIPTION OF THE WORK

- A. Description of Work is as indicated in the Contract Documents (drawings and specifications).
- B. References to other Contractors in Section 22 Contract Documents shall refer to the various Section Contractors involved with specified portions of other Sections of the Work.
- C. Contractor shall examine the Contract Documents for the entire project and shall become familiar with the various features affecting their work.
- D. Where Work specified under other Sections of the specifications connects to equipment, which is a part of Section 22 Work, Section 22 Contractor shall provide proper connection(s) to such equipment. Field measurements shall be made to make connecting work come true and line up with the item being connected.
- E. Contractor shall provide minor items and accessories, or devices reasonably inferred as necessary to the complete and proper installation and operation of any system, whether or not they are specifically called for in the Contract Documents.
- F. Definitions:
 - 1. "Piping" includes pipe, fittings, valves, hangers, supports and accessories.
 - 2. "Concealed" means hidden from sight in chases, furred spaces, shafts, above suspended ceilings, embedded in construction, in crawl spaces, or buried.
 - 3. "Exposed" means not installed underground, or not "concealed", as defined above.
 - 4. "Invert elevations" means the elevation of the inside bottom of pipe or duct.
 - 5. "Unfinished Rooms or Spaces" refers to areas similar to Mechanical and Electrical Equipment Rooms, Pump Rooms, Boiler Rooms, Janitor's Closets, etc.
 - 6. "Finished Rooms or Spaces" refers to areas similar to Offices, Public Corridors, Public Toilet Rooms, Classrooms, Conference Rooms, Cafeterias, etc.

1.7 DECLARATION OF INTENT

- A. Work in this Section includes the furnishing and installing of items included in the Contract Documents. Further, the Work also includes the furnishing of labor, supervision, materials, equipment, tools, parts, accessories, and other items inferred as necessary for the installation of the Work.
- B. Question of intent before constructing this project shall be referred to the Architect/Engineer for a decision before continuing.
- C. The term "Contractor" shall include the Contractor and all Sub-contractor(s) employed by the Contractor to perform the Work of Section 22.
- D. Where the terms "furnish", "provide" and "install" are used, the intent is that the Contractor shall purchase, deliver to the job site, store as necessary, set in place, and install completely items of equipment. Also included in these terms shall be the complete checkout, start-up, and operation of systems.
- E. Where the term "install in accordance with manufacturer's recommendations" is used, the intent is that the Contractor shall be responsible for providing and installing the equipment in accordance with the best recommendations of the manufacturer. Auxiliary piping, water seals, valves, electric connections, etc., recommended by the manufacturer or required for proper operation shall be furnished and installed complete. A copy of the manufacturer's installation recommendations shall be kept in the Job Superintendent's Office and shall be available for the Architect/Engineer and the Owner's representative to review.
- F. Where the term "install in accordance with applicable local and state codes" is used, the intent is that the Contractor shall have become familiar with the applicable codes and shall in conjunction with the Architect/Engineer to ensure that code requirements are met.

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- G. Where the term "install equipment furnished by others" or its derivation is used, the intent is that the Contractor shall receive the item(s) of equipment F.O.B. at the job site, weatherproof and store the item(s) until time of installation and install the item(s) indicated. Also included in the term "install equipment furnished by others" is the complete check-out of the equipment, coordination with other contractors that provide connections to the equipment, start-up, operation of systems and Operation and Maintenance Manuals at project close-out.
- H. Equipment or devices referred to in these Contract Documents in the plural or singular shall not be taken to mean that there are several or just one of the items or item mentioned. The quantity required of any item shall be as indicated in the Contract Documents, or as may be required to comply with the general intent of these Contract Documents.
- I. Contractor shall be responsible for ensuring that the equipment installed by them is completely installed in accordance with manufacturer's recommendations including electrical wiring for power, interlock and control.

1.8 BUILDING UTILITIES CONNECTION (WATER, SEWER, AND GAS)

- A. The Contractor shall make application to the local utility companies for utility connections to new facilities and for utility revisions to existing facilities. They shall obtain permits and shall pay fees and connection costs associated with extending the utilities from the public Mains to the facility under this contract. At project completion the Contractor shall submit to the Architect/engineer copies of the utilities' permits for delivery to the Owner.

1.9 QUALITY ASSURANCE OF MATERIALS AND EQUIPMENT

- A. Materials used in Work shall be new and of the quality specified. Apparatus and materials used in Work which are subject to approval by Underwriters shall bear the Underwriters Label (UL) of Approval.
- B. Materials furnished under shall, as a minimum requirement, conform to the applicable International Code and the Code referenced sections of ASME, AWWA, NEMA, NEC, ASTM, ANSI, ASHRAE, and SMACNA specifications and tests for best grade and best suited materials, equipment, or appurtenances, considering their locations and use. The Engineer shall have the right to reject any materials that do not conform to the above minimum standards.
- C. Asbestos, lead, mercury, cadmium, chromates or any toxic substance shall not be allowed.

1.10 MINIMUM STANDARDS AND INSPECTIONS FOR BOILERS AND UNFIRED PRESSURE VESSELS

- A. Boilers, unfired pressure vessels, and water heaters (where required) shall be constructed, installed, inspected, and stamped in accordance with the requirements of local and State Boiler and Pressure Vessel Construction and Installation Codes, and the American Society of Mechanical Engineers Boiler and Pressure Vessel Construction Code. Boilers and pressure vessels shall bear ASME, N.B., UL, state and local stamps and shall be designed and constructed in accordance with the requirements of the following standards:
 - 1. ANSI Z21.13, Gas Fired Low Pressure Steam and Hot Water Boilers.
 - 2. ANSI Z21.59, Gas Fired High Pressure Steam and Hot Water Boilers.
 - 3. ASME Boiler and Pressure Vessel Code, Sections I, IV and IX.
- B. Before operation of any boiler or unfired pressure vessel, Contractor shall have it inspected by the local state boiler inspector or by a commissioned insurance company inspector, as required by state and local codes and shall receive a certificate of inspection from the inspector permitting operation of the equipment. Contractor shall post certificate of inspection under glass in the boiler room, or near the vessel. Where required by code, upon completion of the installation and at the time of internal or certificate inspection, each boiler or pressure vessel shall be stamped by the inspector with the state and/or local code official serial number, indicating the installation has been inspected and approved. Contractor shall not start up or operate any boiler or unfired pressure vessel until the above inspections are made and the Certificates of Inspection are posted near the vessel.

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- C. Operation of boilers shall be as recommended by the boiler manufacturer and by "Recommended Rules for Care of Power Boilers, Section VIII, ASME Boiler Code."
- D. Installation of gas fired boilers shall conform to the requirements of the latest editions of the American Gas Association (AGA), the National Fuel Gas Code NFPA 54, International Fuel Gas Code, International Mechanical Code and local and state gas codes as applicable.

1.11 MANUFACTURER'S TRADE NAMES, QUALIFICATIONS AND EQUALS

- A. Manufacturer's trade names or catalog numbers used in these Contract Documents are not to be considered as proprietary. The intent is to denote function, type, size, quality, and design features of equipment specified.
- B. Manufacturers who have been regularly engaged in the manufacture of plumbing equipment and whose products have been in satisfactory use in similar service for not less than five years, shall be considered as qualified to provide the plumbing equipment for this project.
- C. Equipment specified as "or equal", shall mean equal in the opinion of the Architect/Engineer.
- D. Contractor is free to offer for consideration equipment items of equivalent type, size, quality, and performance to those specified after the contract is signed; however, they shall be prepared to furnish specified materials and equipment where substitutions are rejected on their original submittal.

1.12 COORDINATION OF WORK

- A. Contractor shall coordinate the placement their Work with that of other Contractors on the project in order that there will be no delay in the proper installation and completion of several parts of the Work. Any required relocation of ductwork, equipment, piping, valves, etc. required because of an interference caused by Contractor shall be made at the Contractor's expense.
- B. Where material or equipment is too large to pass through finished openings of the building, Contractor shall arrange with the Boundary Contractor for adequate openings in construction until such material or equipment has been placed.
- C. The Architect/Engineer and the Owner may change the location of any item of equipment five feet and any section of piping, equipment, Etc., ten feet in any direction without extra charge, provided such changes are made prior to installation of the equipment being moved.

1.13 SPACE PREFERENCE

- A. Liquid transfer mains shall not take preference over plumbing lines directly below plumbing fixtures, or over electrical conduits directly above or below electric switchgear and panels. No piping conveying liquids shall be installed directly over electrical or elevator equipment.

1.14 WORK INVOLVING SECTION 23

- A. Contractor providing the Section 22 Work shall provide capped and valved service water connections for Section 23 Contractor as indicated in the Contract Documents. Final service water piping connections to Section 23 equipment will be the responsibility of the Section 23 Contractor providing the Work. Refer to the drawings for size of piping connections.

1.15 WORK INVOLVING SECTION 26

- A. Section 26 Contractor will furnish and install wiring as shown on the Section 26 Contract Documents and indicated in the specifications for plumbing equipment installed under Section 22. Section 26 Contractor wiring for plumbing equipment includes the single and three-phase wiring above 24 volts as follows:
 1. Power wiring to plumbing equipment.

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2. Interlock wiring above 24 volts for plumbing equipment.
 3. Control wiring above 24 volts for plumbing equipment and its control component.
- B. Where Section 22 equipment is started and stopped from motor control centers (MCC), Section 26 Contractor will furnish and install motor starters and the MCC. Interlock wiring between starters in the MCC will be furnished and installed by the Section 26 Contractor.
- C. Where Section 22 motor starters are located in MCC and the Section 22 equipment is started and stopped remotely from push-button stations, Section 22 Contractor shall furnish the push-button station and turn same over to Section 26 Contractor for mounting and wiring.
- D. Section 26 Contractor shall provide disconnect devices for Section 22 equipment that is not furnished with factory installed disconnect devices.
- E. Motors for Section 22 equipment, not furnished mounted on equipment from manufacturer, shall be furnished and mounted by the Contractor installing the equipment. Section 26 Contractor shall provide power wiring for the motors as indicated on the Section 26 drawings.
- F. Motor starters for Section 22 equipment, not factory mounted, shall be furnished by the Contractor furnishing the equipment. Motor starters shall be turned over to the Section 26 Contractor for mounting and wiring.
- G. Line voltage (24 volts and above) for Section 22 control devices, not factory mounted and wired, shall be furnished by the Contractor installing the equipment. These control devices shall be turned over to the Section 26 Contractor for mounting and wiring. Control devices shall be as indicated on the Section 26 drawings.
- H. Section 22 Contractor shall provide the Section 26 Contractor with necessary drawings showing locations of mechanical equipment requiring power wiring, line voltage interlock wiring and line voltage control wiring. Along with the drawings, the Section 22 Contractor shall provide the Section 26 Contractor(s) with wiring diagrams showing all control devices requiring wiring. The referenced drawing and wiring diagrams shall be furnished to the Section 26 Contractor within 21 workdays after the Contract is awarded.
- I. Section 22 Contractor shall furnish and install low voltage (24 volt and below) control and interlock wiring for the equipment. Low voltage wiring shall be run in conduit as specified in Section 26 Contract Documents.

1.16 WORK INVOLVING THE SECTION 02 THRU 20 CONTRACTORS

- A. The following items will be provided by Section 02 thru 20 Contractors for Section 22 equipment:
1. Chases, recesses and other openings in the construction of the building for location of pipe, duct and other Section 22 equipment requiring same. Section 22 Contractor shall be responsible for proper location and size of openings, chases and recesses required for their work.
 2. Structural steel supports for mounting of Section 22 equipment on the roof of the building or on grade. Section 22 Contractor shall provide, to the Section 02 through 20 Contractors, dimensioned drawings of the equipment to be mounted on the structural supports.
 3. Formed concrete required for Section 22 Work, including mechanical equipment pads. Section 22 Contractor shall provide, to the Section 02 through 20 Contractors, dimensioned drawing of mechanical equipment requiring formed concrete work.
 4. Sign at each access door to refrigerating machinery rooms stating that the machinery rooms "Restricted to Authorized Personnel".
 5. Toilet Room accessories, paper holders, etc.
 6. Roof drainage for areas of the building served by gutters and downspouts.
 7. Painting for Section 22 will be furnished by the Section 02 through 20 Contractors.
 8. Cutting and repairing of existing roof and deck for installation of Section 22 equipment, piping, support frames, etc.

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1.17 WORK INVOLVING THE OWNER

- A. Owner will furnish the following:
 - 1. Production equipment, including installation of the equipment.
 - 2. Final process piping connections to Owner furnished equipment.
 - 3. Fire extinguishers.

1.18 WORK INVOLVING THE LOCAL UTILITY COMPANIES

- A. Local Gas Utility Company will furnish (Contractor to coordinate) high pressure gas service from public gas service main to the meter and pressure regulator center at the facility. The Local Gas Utility Company will furnish and set the gas meter and gas pressure regulator center at location shown in the Contract Documents (Contractor to coordinate).
 - 1. The Section 22 Contractor will make connection downstream of the meter and regulator center and distribute gas to the facility per the drawings.
 - 2. The Contractor shall pay all fees associated with the gas service.
- B. Local Water Utility Company will extend public water service taps onto the property for domestic water service for the facility.
 - 1. The Contractor shall pay all the fees associated with the domestic water service tap. The local utility company will furnish and install the domestic water meter.
 - 2. The Contractor shall pay all fees for water meter installation.
- C. Local Sewer Utility Company will furnish the sanitary sewer and the storm sewer connection to within five feet of the facility property line for connection by the Contractor providing site utility work.
 - 1. The Contractor shall pay all fees associated with the sanitary and storm sewer service.

1.19 DELIVERY AND STORAGE OF SECTION 22 MATERIALS AND EQUIPMENT

- A. Contractor shall be responsible for the purchase, delivery, and storage of materials and equipment indicated to be supplied in Contract Documents, and it shall be the Contractor's responsibility to schedule the delivery of material and equipment to permit uninterrupted construction of each phase of the Work.

1.20 PROTECTION OF FINISHED FLOORS

- A. Where heavy equipment is to be moved across finished floors, Contractor shall make provisions to protect the floor.
- B. Contractor shall provide a temporary floor covering over the floor which will assure that oil and pipe cuttings do not come in contact with the finished floor during pipe cutting and threading, or welding operations. Temporary floor covering shall be plywood, or other materials as may be approved by the Architect/Engineer. Floor covering shall be removed as work is completed in each area.
- C. Damage to finished floors resulting from activities of Contractor shall be repaired at their own expense.

1.21 OPENINGS IN CONSTRUCTION

- A. Chases, recesses, and other openings in the construction of the building required for the location of pipes, ductwork, or other mechanical equipment will be provided by the Building Trades Contractor. Contractor(s) shall be responsible for the proper location of chases, recesses, and openings required for their Work, and shall advise the Building Trades Contractor of the sizes and locations, and furnish the necessary drawings of those required for their Work in sufficient time to allow for the provisions of same.
- B. Contractor shall provide sleeves, etc., required for the introduction and placement of their Work to the Section 02 through 20 Contractors, and shall be responsible for the correct location of same.

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- C. Beams or columns shall not be pierced without permission of the Prime Architect/Engineer, and then only as directed.

1.22 CUTTING AND PATCHING

- A. Where Work penetrates walls, floors and roofs that the General Bidding Contractor has finished, Contractor shall employ workers to do cutting and patching who are skilled in the particular trade involved. Contractor shall bear the cost of the cutting and patching if due to a lack of coordination by the Contractor.
- B. Openings for pipe penetrating concrete walls, floors and roofs, where no sleeve has been provided, shall be core drilled. Core drilling shall be as directed by the Architect/Engineer, to avoid unnecessary damage and structural weakening.
- C. Paved areas that are required to be cut for placement of Work shall be repaired by the Contractor requiring the cut. Materials and construction used to patch cuts in paving shall be similar to the original.

1.23 PROTECTION OF WORK

- A. Contractor shall protect their Work from damage by freezing, breakage, dirt, foreign materials, etc., and shall replace Work so damaged. They shall also use care in the handling and setting of equipment. Equipment that has been damaged during moving or handling shall not be used on the job and shall be promptly removed from the site of the Work.

1.24 SPECIAL REQUIREMENTS FOR EXISTING SERVICE INTERRUPTION

- A. It is essential that Work does not interfere with the Owner's normal production operations. Contractor will be held responsible for damages caused as a result of their failure to coordinate their Work with the Owner.
- B. Normal building fire protection, water, sewer, gas, electricity, etc. utility services shall not be interrupted by Section 22 Contractor(s) without prior written approval from the Owner. Duration of utility service interruption shall be kept to the absolute minimum. Clean, flush and sanitize piping after interruption. Refer to other divisions of Contract Documents for cleaning, flushing and sanitizing of piping systems after interruption.

1.25 EQUIPMENT SPACE REQUIREMENTS

- A. Contractor are cautioned to pay particular attention to the space limitations for equipment upon which they base their bid and shall determine that the equipment will fit properly into the space provided with adequate clearance for service and adjustment. Where equipment is supplied requiring revisions in layout, arrangement, etc., Contractor shall submit complete drawings, with submittal, for approval by the Architect/Engineer.

1.26 DAMAGE TO OTHER SECTIONS WORK

- A. Contractor shall use every precaution to protect the Work of other trades, and they will be held responsible for damage to other Work caused by their Work, or through the neglect of their workers.

1.27 CHANGES TO OTHER SECTIONS WORK

- A. Where changes are required in the Work of other trades as a result of the use of materials or equipment other than that specified, such additional cost shall be paid for by Contractor without additional cost to the Owner.

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1.28 SUBMITTALS

- A. Within thirty (30) days after the award of the contract, Contractor shall deliver equipment submittals to the Architect/Engineer for review. Submittals shall consist of seven copies of descriptive literature, cuts, and operating data on each item of equipment and materials being supplied, either as specified or as an equal to those specified. Submittals shall be bound in three-ring, hardback binders with project identification labels on the front of the binders and the edge of the binders.
- B. Section 22 equipment and materials supplied shall have manufacturer's published capacity and performance ratings equal to or greater than the requirements indicated by the drawings and specifications. Equipment and material offered for review based on performance guarantee by letter from manufacturer or local representative is not acceptable as a substitute for manufacturer's published ratings.
- C. Submittals shall include a cover sheet for each item listing the identifying symbol or mark, equipment type, capacities, standard features, and options that are to be furnished as specified. Listing shall be in similar order to schedule on drawings or to description given in specifications. Identifying symbols or marks used on drawings shall be clearly cross-referenced in the listing. Capacity and performance data shall be given in same form, units, and completeness as used on drawings and in the specifications. Catalog cuts showing more than one model of a product shall be clearly marked indicating which model is being submitted.
- D. Processing Time: Allow fourteen (14) business days for submittal review, including time for re-submittals, fourteen (14) business days.
- E. Three copies of the final reviewed submittal shall be retained by the Contractor for insertion into the Operating, Maintenance and Service Manuals for delivery to the Architect/Engineer. The Architect/Engineer shall deliver the O M S Manuals to the Owner at the close out of the project.
- F. Contractor shall furnish the Section 26 Contractor a list of all items of Plumbing equipment requiring power, interlock and control wiring to be furnished under Section 26. This listing shall be submitted to the Architect/Engineer for review within thirty (30) working days of "Notice to Proceed".

1.29 SHOP DRAWINGS

- A. Shop Drawings are required on items which are to be fabricated by Contractor. Contractor shall prepare and submit 1/4" scale Shop Drawings to the Architect/Engineer for review before fabrication or purchase of equipment.
- B. Shop Drawings, at 1/4" scale, are required of plumbing equipment rooms and mezzanine equipment areas showing plumbing equipment to be installed in these spaces. Piping above 3" pipe size shall be shown in two-line form. Drawings shall show valves and accessories to be installed and shall show access requirements for maintenance and service.
- C. Shop Drawing shall be delivered to the Architect/Engineer after the award of the contract and before ordering and fabricating equipment.

1.30 ARCHITECT/ENGINEERS REVIEW OF SUBMITTALS AND SHOP DRAWINGS

- A. Contractor shall examine submittal data and shop drawings before presenting them to the Architect/Engineer for review. Contractor shall indicate by their signature and date on the submittals and shop drawings that the submittals and/or shop drawings comply with requirements of the specifications and that the equipment they propose to use will fit properly into the space provided with adequate clearance for service and maintenance.
- B. Contractor shall provide written notice, with their submittals, of deviations in equipment type, size, capacity, etc. from the requirements of the Contract Documents. The Architect/Engineer shall not be responsible for any deviations from the Contract Documents not brought to the attention of the Architect/Engineer in writing by the Contractor at the time submittals are sent for review

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- C. The Architect/Engineer's review and approval of submittals and shop drawings is only for the limited purpose of checking the same for conformity with design concept of the Work as established in the Contract Documents and shall not relieve the contractor from responsibility for errors or omissions in the submittals. The review is not intended to be for the purpose of determining the accuracy of other matters that may be contained in submittals. The correctness, as set forth in the Contract Documents, of matters such as dimensions, weights or gauges, fabrication processes, coordination with other trades, quantities, performance of equipment and systems designed by Contractor, techniques, sequence of operation, procedures, safety precautions, etc., shall be the sole responsibility of Section 22 Contractor.
- D. The Architect/Engineer's review of a specific item shall not indicate approval of an assembly of which the item is a component, or in which it functions.

1.31 ELECTRICAL PROVISIONS FOR MECHANICAL WORK

- A. Section 22 Contractor shall furnish, and mount motors and drives for mechanical equipment.
- B. Section 22 Contractor shall furnish motor starters, push-button stations, relays, etc., for their equipment, and shall turn same over to the Section 26 Contractor for mounting and wiring.
- C. Section 22 Contractor shall label each starter and control device with black plastic laminated nameplate inscribed with one inch (1") white letters stating the function of each control device, i.e., "PUMP CP-1 STARTER".
- D. In general, power services to motors 3/4 HP and larger shall be 3-phase, 3-wire of voltage class, as indicated in the Section 22 Contract Documents.
- E. Single phase motors, less than 3/4 HP shall be of the capacitor type in accordance with NEMA specifications and shall, in general, be wound for 120-volt, 60 cycle, AC current. Motors 1/6 HP and smaller may be either capacitor or split phase type, except that motors for unit heaters shall be of the permanent split capacitor type.
- F. Motors for pumps shall be drip proof type.
- G. Polyphase motors shall be NEMA Class B, Design B, squirrel cage, induction motors, single speed for operating voltage indicated. Motors shall have proper frame and enclosure for service intended and shall be rated for continuous duty at 100% of rated capacity. Select motors with proper class insulation and temperature rise for the ambient temperature in which they are to operate. Motors shall be selected so that the BHP requirement of the driven machine, including drive mechanism, is equal to or below the continuous HP rating of the motor without use of service factors.
- H. Motors for equipment furnished under Section 22 of the specifications shall comply with the Energy Policy Act of 1992 and shall operate at not less than the efficiency listed in NEMA Standard MG1. Motors shall be rated for inverted duty where motor speed is determined from VFD.
- I. Motors shall be provided with ball bearings with dustproof and leak-proof rings, except that motors for air handling units shall be provided with sleeve bearings.
- J. Motors shall be dynamically balanced and tested and shall be selected for quiet operation.
- K. Motors with V-belt drives shall be provided with slide rail base and adjustable screw device.
- L. Motors for use outdoors shall be of the totally enclosed fan cooled type (TEFC).
- M. Equipment to be supplied by Section 22 Contractor requiring a motor of larger horsepower rating than that indicated in the Section 22 Contract Documents shall be brought to the attention of the Engineer during the project startup process in order for changes to be made prior to the start date.

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- N. Motor starters shall be full voltage across-the-line magnetically operated type. Unless indicated otherwise, each magnetic motor starter shall be of the combination type, containing a non-fusible disconnect switch within the starter case. Motor starters for all applications on this project shall be provided with a minimum of four auxiliary contacts to provide necessary interlocking requirements. Unless built-in as an integral part of the equipment, starters shall be the product of a single manufacturer. Motor starters shall have H.O.A. or start-stop push-button stations mounted in starter cover. Where motors are controlled automatically from a pilot device such as a float switch, thermostat, or remote push-button station, etc., HAND/OFF/AUTOMATIC transfer switch shall be mounted in starter cover in lieu of the START/STOP push-button control. Starters shall be furnished with separately fused control voltage transformers for 120-volt control circuit. Motor starters shall have RUN pilot light mounted in cover of starter.
- O. Starters for small single-phase motors which are not automatically controlled may be manual motor watchman type with proper heater elements, Allen-Bradley Bulletin #600 with RUN pilot light. Flush mounted in finished areas of the building and surface mounted in equipment rooms.
- P. Motor starters installed indoors in dry locations shall be mounted in NEMA 1 sheet metal enclosures. Starters in wash-down areas shall be mounted in NEMA 4 sheet metal enclosures.
- Q. Motor starters mounted outdoors, or in other locations subject to moisture, dust, etc., shall be mounted in the proper NEMA enclosure for the application.
- R. Motor starters shall be equipped with heater elements corresponding to the full load current of the motor. Where multiple heaters are used in a motor starter, the heaters shall be sized as recommended by the manufacturer of the heaters.
- S. Push-button stations are to be provided where motor starters are not located within sight of the equipment, within 25 feet of the equipment, or where indicated on the drawings. Push-button stations shall be momentary contact type with RUN pilot light.
- T. Contractors under Section 26 will furnish and install, where indicated on the Section 26 drawings, power wiring, start/stop circuit wiring, line voltage control and interlock wiring for the mechanical equipment supplied under Section 22.
- U. Wiring for the plumbing equipment shall be installed in conduit and shall be done in accordance with the requirements of the National Electrical Code and requirements of Section 26 Contract Documents.

1.32 OPERATING, MAINTENANCE AND SERVICE MANUALS (OMS)

- A. Prior to completing Section 22 Work, Section 22 Contractor(s) shall compile OMS Manuals in electronic multiple file composite PDF format.
 - 1. Electronic OMS Manuals shall be made up using files prepared by equipment manufacturers where possible.
 - 2. Electronic OMS Manuals shall be composed of files named, bookmarked and grouped by system and subsystem to produce a readily navigable file tree.
- B. Prior to completing Section 22 Work, Section 22 Contractor(s) shall compile three OMS Manuals. OMS Manuals shall be made up using indexed, hard cover, three-ring binders and shall contain the following:
 - 1. Names, addresses, and telephone numbers of Contractor and equipment suppliers, systems installation subcontractor(s) and service companies.
 - 2. Manufacturer's descriptive literature, final approved shop drawings and submittals, performance data, curves, ratings, diagrams, spare parts and replacement parts lists, installation and operating instructions, maintenance and service manuals for:
 - a. Each item of plumbing equipment
 - b. Valves and specialties
 - c. Specialty items
 - 3. Where diagrams are too large for the binder, arrange manila pockets with reinforced holes to hold folded drawings.
 - 4. Procedure for starting and stopping the systems.

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5. Maintenance instructions.

- C. Diagrams applicable to plumbing equipment shall be permanently sealed to durable transparent plastic. Diagrams applicable to indoor mounted equipment shall be posted in the Equipment Room and/or Equipment Areas where indoor mounted equipment is located. On outdoor mounted equipment, locate diagrams on inside face of access panel to controls compartment.

1.33 DESIGNATED CONSTRUCTION RECORD CONTRACT DOCUMENTS

- A. Contractor shall designate and maintain a complete up-to-date set of Contract Documents (drawings and specifications) to mark up for Construction Record Document purposes. The Designated Construction Record Contract Documents shall be maintained in a neat condition and shall clearly show all field changes and change order changes that are made after project has been awarded.
- B. Designated Construction Record Contract Documents shall be available at the job site for review by the Architect/Engineer, the Owner, and other trade contractor(s).

1.34 CONCRETE WORK

- A. Concrete Work shall conform to Section 03 specifications and shall be 3000-pound concrete minimum.
- B. Contractor shall be responsible for furnishing concrete for Work, including anchors for their equipment, except as follows:
- C. The Contractor under Section 03 of the specifications will furnish and install formed concrete requirements for Section 22.
- D. Contractor shall furnish size and location of equipment requiring concrete foundations, pads and bases to the Bidding Contractor under Division 03.
- E. Contractor shall furnish anchor bolts and anchor bolt sleeves of adequate size and length to properly anchor equipment to be installed. Anchor bolts and sleeves will be set in concrete foundations or bases under Section 03, "Concrete", under full supervision of the Contractor who provides the respective equipment.
- F. Housekeeping pads shall be 4" high minimum, except that pads for pumps shall be 12" high unless otherwise indicated.
- G. Provide 3" high x 3" wide concrete curbs, or 3" x 3" x 1/4" steel angle curbs for all duct penetrations through floors. Steel angles shall be mitered and welded and caulked to make watertight seal around floor opening.

1.35 STRUCTURAL SUPPORTS

- A. Contractor shall furnish and install necessary structural supports for supporting their equipment from building structure, including necessary supports for duct, air handling units, piping, pipe hangers, special brackets, etc., except as noted otherwise in these specifications.
- B. Contractor shall furnish and install necessary supports for pipe anchors. Pipe anchors shall be sized by a registered Structural Engineer.
- C. Shop drawings of supports shall be provided to the Architect/Engineer for review. All supports shall meet the seismic requirements of the governing codes.

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1.36 ROOF MOUNTED EQUIPMENT

- A. Contractor shall attach roof mounted equipment to the roof support structure by welding attachments, or by bolting the curbs to roof support structure. Equipment set on roof-curbs shall then be bolted to the roof-curbs and shall meet the seismic requirements of the governing codes.
- B. Structural steel supports for mounting of mechanical equipment on the roof of the building shall be furnished and installed by the Contractor under Section 05. Contractor shall coordinate the size of the structure for their equipment with the Section 05 Contractor and they shall properly secure their equipment to the structural support members to withstand 150-MPH winds. The structural supports shall meet the seismic requirements of the governing codes.
- C. Items of equipment such as flues and stacks that penetrate the roof shall be securely supported below the roof and shall be guyed above the roof with cable and turnbuckles to withstand 150 MPH wind velocity. Supports shall meet the seismic requirements of the governing codes.

1.37 PROJECT UTILITIES LOCATION AND CORDINATION

- A. Contractor shall locate and protect existing above ground and below ground utilities and other underground Work in a manner which will ensure that no damage or service interruption will result from excavating or backfill. In the event of accidental damage to existing utilities by a Contractor, that Contractor shall bear costs to repair same. Contractor shall protect property from damage resulting from their excavating and backfilling and they must coordinate excavations with weather conditions to minimize possibility of washouts, settlement, or other damages or hazards.

1.38 EXCAVATION

- A. Trenches for underground piping shall be excavated true to line and shall be graded accurately and in accordance with applicable sections of these specifications, to provide uniform bearing and support.
- B. Do not excavate for Work until the Work is ready to proceed without delay so that total time lapse from excavation to completion of backfilling will be minimal.
- C. Shore and brace trenches to protect workers and adjacent structures. Comply with local codes and regulations, OSHA requirements, and the "Manual of Accident Prevention in Construction", of the Associated General Contractors of America, Inc. Do not remove shoring and bracing until trench is backfilled sufficiently to protect pipe and prevent injurious caving.
- D. Unsatisfactory soil conditions at bottom of excavations may require additional depth to reach satisfactory soil bearing conditions. Where additional depth of excavation is required to reach satisfactory soil bearing conditions, Contractor shall backfill with sand, coarse gravel or other suitable sub-base material, compacted as directed, to the indicated excavation depth.
- E. Store excavated material (temporarily) near excavation site in a manner that will not interfere with, or damage, excavation or other work. Retain excavated material that complies with requirements for backfill material. Dispose of excavated material that is either in excess of quantity needed for backfilling or does not comply with requirements for backfill material. Remove unused material from project site and dispose of material in a lawful manner.
- F. Wherever the soil at or below the required pipe grade is unsuitable for supporting sewers or other piping and appurtenances, special supports shall be provided.
- G. Trenches for water lines shall be of a depth that will provide a minimum cover over the top of the pipe of three feet below finished grade and avoid interference with other utility piping.
- H. No piping shall be installed in areas where fill for concrete floor is to be placed until after fill is placed. After laying pipe, the Contractor shall then replace and compact the fill.

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1.39 DEWATERING

- A. Maintain dry excavations. Pump minor inflow of ground water from excavations; protect excavations from major inflow of ground water by installing temporary sheeting and waterproofing. Provide adequate barriers which will protect other excavations and below-grade property from being damaged by water, sediment, or erosion from or through Section 22 Work excavations.

1.40 BACKFILLING

- A. Backfill trenches only after piping has been inspected and tested and the locations of pipe and appurtenances have been recorded on as-built drawings.
- B. After pipe has been laid and jointed, the pipe shall be bedded in the trench and made secure against movement in the trench by backfilling the trench to the spring-line of the pipe with 3/4" washed gravel, sand, backfill, or suitable on site material.
- C. Backfill by hand with 3/4" washed gravel, sand, or suitable on-site material, for a depth of 12" above the top of the pipe.
- D. For the remaining trench depth, backfill with excavated material, except that the material may contain stones, rocks, concrete, or masonry materials (but no cinders), with a maximum dimension of four inches (4"), providing that the voids in such coarse materials are completely filled with earth or granular material.
- E. Thoroughly compact backfill by tamping with a manual tamp or an approved mechanical tamping device. If the soil is of granular nature, tamping shall be performed using puddling with hose and long pipe nozzle after the trench is backfilled. Under pavement and other surfacing, the backfill shall be compacted solidly with mechanical tampers in layers not more than six inches (6") thick, measured loosely.
- F. Backfilling of trenches or other excavation shall be accomplished in a manner to ensure the following compaction:
 - 1. Ninety-five percent (95%) compaction modified proctor within the building area, under paved areas, slabs, steps, and walkways.
 - 2. Ninety percent (90%) compaction modified proctor outside the building footprint under unpaved areas.
- G. Backfill simultaneously on opposite sides of piping and compact simultaneously. Do not allow backfill to dislocate the work from installed positions.
- H. Condition backfill material either by drying or by adding water uniformly to whatever extent may be necessary to facilitate compaction to required densities. Do not backfill with frozen soil materials.

1.41 CONCRETE AND PAVEMENT PATCHING

- A. Where placement of underground piping disturbs paved areas; the pavement shall be repaired with material of the same type and strength as that removed. Patching of pavement shall be performed by skilled tradesmen.

1.42 PIPE AT FOOTINGS, BEAMS, FLOORS, AND WALLS

- A. Piping shall not be run through footings but may run through foundation walls above footings. Pipe running through foundation walls shall be provided with sleeves. Pipes running parallel to footings shall have the minimum clearance required by the governing codes.
- B. Structural members, or reinforcing steel, shall not be cut or weakened. Where construction necessitates the routing of piping through structural members, or under footings, written permission to make such

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installation shall be obtained from the Architect/Engineer. Such permission will not be granted, however, if any other method of installation is possible.

- C. Except where special permission is granted by the Architect/Engineer for pipe to be cast in place, pipes passing through concrete, masonry walls, floors, or beams shall be provided with sleeves.

1.43 CLEANING OF EQUIPMENT

- A. After completion of the installation and before any equipment is operated, the equipment shall be thoroughly cleaned, internally and externally, couplings shall be aligned, and bearings shall be properly lubricated.

1.44 FLUSHING OF PIPING

- A. Piping systems, except air and gas shall be flushed with cold water for a period of not less than one (1) hour. Contractor shall furnish and install all valves, temporary connections, and materials necessary to complete the flushing and shall remove them upon completion of the flushing operation. Systems to be flushed shall have valves installed at the ends of all mains and branches to facilitate proper flushing of the system. Each main and branch shall be flushed clean. Piping shall not be connected to coils prior to flushing. Control valves shall not be installed prior to flushing.
- B. Contractor shall provide temporary cone shaped "inline" strainers at the suction inlet to all pumps and compressors during the time the piping systems are being flushed out. Strainer cones shall be 1/8" mesh wire with a total free area opening equal to the cross-sectional area of the pipe in which they are installed. During the flushing period, all strainers shall be opened, examined, and cleaned so as to assure unrestricted water flow during the flushing. At the completion of flushing, all strainers, dirt pockets, and traps shall be opened and cleaned so that the system is left in a thoroughly clean condition.

1.45 TESTING OF PIPING

- A. Contractor shall test piping systems in accordance with their respective and applicable governing codes (state, local or insurance codes) and the requirements specified herein. Where more stringent requirements do not supersede, piping shall be subject to pneumatic or hydrostatic tests of 1½ times the design pressure (design standard psig) for the particular system tested. Piping shall not be subjected to actual working conditions until successful tests have been performed. Type of test shall be at discretion of the Contractor, except that air and gas systems shall only be tested pneumatically.
- B. System pressure shall not drop over 1/2 PSIG in a twenty (20) minute period nor drop over 2 PSIG in a two (2) hour period under the test pressure.
- C. Defects discovered during the tests shall be immediately corrected by Contractor, at his own expense, and the systems shall be retested to the complete satisfaction of the Engineer authorized to approve the piping installation and Owner's representative. Soldered joints requiring correction and made up with silver brazing alloy shall be remade with new fittings.
- D. Testing of joints for leaks on air and gas piping shall be made with a commercial leak detector solution such as Leak-Tec made by American Gas and Chemicals, Inc.
- E. Contractor shall provide all the necessary items of equipment, and materials and shall make all necessary test connections as are required to properly execute all tests. All tests shall be witnessed by Architect/Engineer and Owner's Representative, who shall be duly notified by Contractor to ensure their being present during the testing. Contractor shall remove extraneous connections after tests have been accepted.
- F. Tests shall be made before piping is insulated, painted, buried, or concealed.

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- G. Piping connected to specialties or equipment with a lower pressure rating than the specified test pressure shall be left unconnected to the equipment, and the test shall be reapplied at the equipment pressure rating.
- H. Sanitary sewers and above ground drainage systems shall be tested in accordance with the requirements of the applicable governing codes. Where local and state codes do not govern, testing shall be by filling systems to roof level and blocking the last site branch prior to entering the city system. Certificates of approval shall be provided by Contractor.
- I. Tests shall be made when the ambient air temperature is approximately constant. Corrections for pressure changes due to temperature change shall be made.
- J. Hydrostatic tests shall consist of pressurizing the system with water to the specified test pressure and examining the exterior surface of the piping and joints for leaks, cracks, or other visible defects. The entire piping system shall be completely drop dry. Excessive pressure drop or evidence of moisture shall require repairs and repetition of tests until satisfactory.
- K. Systems tested hydrostatically shall be free from air (air bled) prior to testing.
- L. Pneumatic tests shall consist of first pressurizing the system with air not to exceed 5 PSIG and examining all joints for leak. After repairs have been made, and the test has been met satisfactorily, the system shall then be pressurized with air to the specified test pressure and checked for excessive pressure drop during the hold period. Excessive pressure drop shall require repairs and repetition of tests until satisfactory.
- M. After testing, air lines shall be blown free with compressed air.
- N. After testing, gas lines shall be completely flushed.
- O. Existing piping connected to new piping to be tested shall be shut off and drained before testing. Take all necessary precautions to vent the expansive force of compressed air trapped during high pressure hydrostatic testing to preclude damage.
- P. Test pressure gauge accuracy shall be a minimum of 1/2 of 1% of indicated reading. Maximum minor intervals shall be 0.5 PSI. A certificate of calibration shall be available upon request.

1.46 STERILIZATION

- A. Contractor shall sterilize each potable cold and hot water system with chlorine, and reflush with water before acceptance by Owner. Chlorine dosage for sterilization shall be at a concentration of 50 PPM total liberated chlorine, held for 24 hours. "HTH" as manufactured by the Penn Salt Corporation, Wyandotte, Michigan, is an approved chlorine producing material for this procedure.

1.47 PIPE IDENTIFICATION

- A. Extent of identification required by this section is indicated on drawings and/or specified in other Section 22 sections.
- B. Lettering on pipe markers and color of pipe markers shall be in accordance with ANSI A13.1 for different size pipes and location of pipes. Lettering must be of adequate size and shall be installed so marker can be read from the floor level.
- C. Furnish and install identification for mechanical piping systems and mechanical equipment, as indicated below.
 - 1. Piping Systems - Self-sticking pipe markers indicating content of piping with flow directional arrows.
 - 2. Valve tags on shutoff and balancing valves in piping systems.
 - 3. Label plumbing equipment with stenciled letters stating unit number.
 - 4. Label starters, disconnects, and control panels provided under Section 22 of these specifications.

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5. Touch-up painting of damaged surfaces on equipment furnished under Section 22.
- D. Piping systems shall be identified with self-sticking pipe markers, "Brady", "Seton", or an approved equal, with directional arrow tape applied to each end of the pipe marker. Piping below ground floor slabs or inside non-accessible piping chases need not be identified.
 - E. Pipe markers shall be installed on piping, as follows:
 1. Piping at maximum spacing of 50 feet between pipe markers.
 2. At branch line connections (within 3 feet of connection).
 3. At valves (within 3 feet of valve).
 4. At equipment connections (within 3 feet of the equipment connection).
 - F. Piping systems shall be marked as follows;
 1. DOMESTIC COLD WATER
 2. DOMESTIC HOT WATER
- 1.48 VALVE IDENTIFICATION
- A. Valves, except motorized control valves, and valves located at equipment, shall have Brady, or an approved equal, brass identification tags at least 1" in diameter and 0.05" thick. Tags shall be fastened to each valve stem by means of chrome plated brass ball chains with "B" couplings.
 - B. Valves shall have prefixes, as follows, for each section of Section 22 Work:
 1. "P", Plumbing, i.e., P-20
- 1.49 VALVE SCHEDULE
- A. Contractor shall prepare a typewritten list of valves in PDF Format to be furnished to the Architect/Engineer for delivery to the Owner. The valve list shall include valves except motorized control valves, and shall show for each valve the number, the use, and the location. All balance valves shall show GPM for which the valve is set.
 - B. Contractor shall furnish a full set of electronic files of the contract drawings showing valve locations and valve numbers, as installed. Drawings shall also show the piping and equipment the valve serves. Drawings shall be prepared using AutoCAD software. The Engineer will provide a set of floor plans on magnetic media in AutoCAD DWG format for the Contractor use in preparing the drawings showing valve numbers.
- 1.50 PAINTING
- A. Painting of materials and equipment furnished under Section 22 of the specifications, if required, will be done under Section 09 of these specifications. Contractor under Section 22 of these specifications shall, however, refinish and restore to the original condition and appearance equipment furnished and/or installed by him which has sustained damage to manufacturer's finish paint during shipment, or construction.
- 1.51 LABELING OF EQUIPMENT
- A. Label each piece of equipment with 4" high stenciled letters stating unit, number, i.e., PUMP P-4", etc. Letters shall be white on equipment with dark exterior color and black on equipment with light exterior color.
 - B. Label each starter, disconnect switch and control panel furnished under this Division of the specifications with black laminated plastic nameplates with 1" high white inscribed letters stating unit number and function of each control device, i.e., "PUMP P-10 STARTER", etc.

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- C. Label each control device, such as thermostats, switches, sensors, etc., furnished under Section 22 of the specifications with black laminated plastic nameplates with 1/2" high white letters stating the unit number and function of each control device, i.e., "P-1 SWITCH", etc.

1.52 ADJUSTING OF EQUIPMENT

- A. When the work is complete, Contractor shall adjust all parts of the systems. All equipment items of the various systems shall be adjusted for proper operation within the framework of design intent, and the operating characteristics as published by the equipment manufacturer.
- B. If it becomes necessary for temporary use of the systems before all parts are complete, to maintain building heat, existing processes, etc., Contractor shall adjust all parts as far as possible in order to make said temporary use as effective as possible. Where blanking off of portions of system is required for temporary operation, this work shall be at Owners expense.
- C. No equipment shall be operated for any purpose until properly lubricated and brought into service condition and authorized or accepted in writing by Architect/Engineer and Owner's Representative.

1.53 FINAL CONSTRUCTION RECORD CONTRACT DOCUMENTS

- A. Contractor shall prepare or pay to have prepared, upon completion of the project, Final Construction Record Contract Documents (drawings) plus they shall provide one set of media for the Owner's use. Reproducible Final Construction Record Contract Documents (drawings and specifications) shall be submitted to the Architect/Engineer for review. After Architect/Engineers review, the Contract Documents shall be delivered to the Owner.
- B. Final Construction Record Contract Documents drawings shall be corrections/modifications to the original Contract Documents and shall show the exact installed locations and sizes of piping, ductwork and equipment installed by Contractor. Underground Work shall be dimensioned from a reference such as a wall or column centerline. Marked up copies of the Designated Construction Record Contract Documents will not be acceptable as Final Construction Record Contract Documents.

1.54 FINAL ACCEPTANCE

- A. Work will not be accepted as complete until acceptance tests have been made, final testing and balancing Work is complete, and the installation is operating properly.
- B. Certification that systems (fire protection, plumbing, boilers, chillers, pumps, AHUs, RTUs, BMS, etc.) have been properly installed and tested shall be submitted by the Section 22 Contractor(s) to the Architect/Engineer for review. Certification will then be presented to the Architect/Engineer for delivery to the Owner before final acceptance.

1.55 INSTRUCTION OF OWNER'S PERSONNEL

- A. After completion of Work and tests and at such time as designated by the Architect/Engineer and the Owner, the Contractor shall provide necessary skilled personnel to operate the entire installation for a period of one day of eight (8) hours. During this time, the Contractor and representatives from the mechanical equipment suppliers shall fully instruct the Owner's representatives in the complete operation, adjustment, and maintenance of the equipment and systems.
- B. The training sessions shall be videotaped and two (2) copies of the tape shall be turned over to the maintenance supervisor.
- C. A sign-in sheet shall be submitted to the Prime Architect/Engineer indicating the name and position of each attendee at the training sessions.

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1.56 GUARANTEE

- A. Contractor shall guarantee their work against defects in materials and workmanship for a period of one year after date of occupancy for commercial purposes, or acceptance by the Owner. Guarantee shall be presented to the Owner in writing and all defects developing within this stated period shall be remedied to the full satisfaction of the Owner by Contractor at no additional cost to the Owner.
- B. The one-year guarantee for items of equipment that the Owner elects to begin using before the completion of the entire project shall begin at the date “beneficial use” by the Owner begins. This date of “beneficial use” shall be established jointly by the Architect/Engineer, Contractor involved, and the Owner. Contractor shall prepare a letter stating the equipment that the Owner has requested for “beneficial use”. This letter shall be signed by the Owner and the Section 22 Contractor involved.

END OF SECTION

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SECTION 22 05 33 HEAT TRACING FOR PLUMBING PIPING

PART 1 GENERAL

1.1 DESCRIPTION

- A. This section describes the requirement for supplying, installing, and testing of the electric heat tracing system of the plumbing piping. Freeze protection shall be utilized for domestic water piping in areas subject to freezing temperatures.
- B. A complete listing of common acronyms and abbreviations are included in Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS.
- B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- C. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.
- D. Section 22 07 11, PLUMBING INSULATION.
- E. Section 26 05 19, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.

1.3 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Where conflicts occur these specifications and the VHA standard will govern.
- B. The Institute of Electrical and Electronic Engineers (IEEE):
515.1-2012.....Testing, Design, Installation, and Maintenance of Electrical Resistance
Trace Heating for Commercial Applications
- C. International Code Council, (ICC):
IPC-2018.....International Plumbing Code
- D. National Fire Protection Association (NFPA):
70-2020.....National Electrical Code (NEC)
- E. Underwriters' Laboratories, Inc. (UL):
508-2018.....Industrial Control Equipment

1.4 SUBMITTALS

- A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
- B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 05 33, HEAT TRACING FOR PLUMBING PIPING", with applicable paragraph identification.

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- C. Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.
 - 1. Rated capacity.
 - 2. Length of cable.
 - 3. Cable spacing.
 - 4. Electrical power requirements.
 - 5. Controls.
 - 6. Enclosures.
 - 7. Accessories.
- D. The shop drawings shall include plans, sections, details, wiring diagrams, and attachments to other work. The wiring diagrams shall include power, signal, and control wiring.
- E. Field quality control test reports shall be submitted.
- F. Complete operating and maintenance manuals including wiring diagram, technical data sheets, information for ordering replaceable parts, and troubleshoot guide:
 - 1. Include complete list indicating all components of the systems.
 - 2. Include complete diagrams of the internal wiring for each item of equipment.
 - 3. Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Ten years' experience in design, engineering, manufacture and support of specified system and components.
- B. Product Requirements:
 - 1. Pipe or tank tracing cable assembly shall be factory assembled, immersed in water for a minimum of 12 hours, and then tested for insulation resistance, high potential breakdown and continuity before leaving the factory.
 - 2. Factory Mutual approved heating cable that has the same wattage per lineal foot (power output), throughout its entire length.
 - 3. UL Listed, thermostat and contactor panel.
 - 4. UL Listed Control/Monitor Panel.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 AS-BUILT DOCUMENTATION

- A. Comply with requirements in Paragraph "AS-BUILT DOCUMENTATION of Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

PART 2 PRODUCTS

2.1 SELF-REGULATING PARALLEL RESISTANCE HEATING CABLES

- A. Self-regulating parallel resistance heating cables shall comply with IEEE 515.1.
- B. The heating element shall be a pair of parallel No. 16 AWG nickel coated stranded copper bus wires embedded in cross linked conductive polymer core, which varies heat output in response to temperature along its length. Cables shall be terminated with waterproof, factory assembled non heating leads with connects at one end and seal the opposite end watertight. The cable shall be capable of crossing over itself without overheating.
- C. The electrical insulating jacket shall be flame-retardant polyolefin.

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- D. The cable cover shall be tinned copper braid and polyolefin outer jacket with UV inhibitor.
- E. The maximum power on operating temperature shall be 150 degrees F.
- F. The maximum power off exposure temperature shall be 185 degrees F.
- G. The capacities and characteristics shall be:
 - 1. Maximum heat output 5.0 W/foot
 - 2. Pipe Diameter: 2".
 - 3. Number of parallel cables: 1.
 - 4. Spiral wrap pitch: none.
 - 5. See electrical drawings for electrical characteristics.

2.2 CONTROLS

- A. Pipe mounting thermostats for Freeze protection shall have be a remote bulb unit with adjustable temperature range from minus 1 to 10 degrees C (34 to 50 degrees F). The thermostat shall be snap action, open-on-rise, single pole switch with minimum current rating adequate for the connected cable. The thermostat shall be remote bulb on capillary, resistance temperature device, or thermistor for direct sensing of pipe wall temperature. The control enclosure shall be corrosion resistant and waterproof.

2.3 ACCESSORIES

- A. Cable Installation Accessories: Fiberglass tape, heat-conductive putty, cable ties, silicone end seals and splice kits, and installation clips all furnished by manufacturer, or as recommended in writing by manufacturer.
- B. Warning Labels: Shall comply with NFPA 70.
- C. Warning Tape: Continuously printed "Electrical Tracing"; vinyl, at least 0.08 mm (3 mils) thick, and with pressure-sensitive, permanent, waterproof, self-adhesive back.
 - 1. Width for Warning Tape on Pipes with Outside Dimension, Including Insulation, Less Than 6 inches, 3/4 inch minimum.
 - 2. Width for Warning Tape on Pipes with Outside Dimension, Including Insulation, 6 inches or Greater: 1-1/2 inches minimum.

PART 3 EXECUTION

3.1 GENERAL

- A. Inspect surfaces and substrates of electric heating cables for compliance with requirements of this specification. Ensure surfaces and pipes in contact with electric heating cables are free of burrs and sharp protrusions.
- B. Notify the Architect / Engineer if the existing substrate conditions are unsuitable for application of heating cables in accordance with manufacturer's recommendations.
- C. If the installation of the heat tracing is unsatisfactory, then the Contractor shall correct the installation at no additional cost or time to the Government.

3.2 INSTALLATION

- A. Electric heating cable shall be installed for the following applications:
 - 1. Freeze protection of plumbing piping: Self-regulating parallel resistance

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- B. Electric heating cable shall be installed across expansion, construction, and control joints according to the manufacturer's recommendations using cable protection conduit and slack cable to allow for movement without damage to cable.
- C. Electric heating cable for pipe freeze protection shall be installed according to the following:
 - 1. Electric heating cables shall be installed after piping has been tested and before insulation is installed.
 - 2. Electric heat cables shall be installed according to IEEE 515.1
 - 3. Insulation shall be installed or applied over piping with electric cables. Refer to Section 22 07 11, PLUMBING INSULATION.
 - 4. Warning tape shall be installed on pipe insulation where piping is equipped with electric heating cables.
 - 5. Provide current transducer to monitor power in heating tape and monitor and alarm from BAS.
- D. Field adjustable switches and circuit breaker trip ranges shall be set.
- E. Heating cables including leads shall be protected from damage.
- F. Equipment shall be grounded according to Section 26 05 19, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.
- G. Wiring shall be connected according to Section 26 05 19, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.

3.3 TESTS

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections:
 - 1. Perform tests after cable installation but before application of coverings such as insulation, wall or ceiling construction, or concrete.
 - 2. Test cables for electrical continuity and insulation integrity before energizing.
 - 3. Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.
- C. Repeat tests for continuity, insulation resistance, and input power after applying thermal insulation on pipe-mounted cables.
- D. If deficiency is found, Contractor shall correct all deficiencies at no addition cost or time to the Government.
- E. Prepare test and inspection reports.

3.4 DEMONSTRATION AND TRAINING

- A. Provide services of manufacturer's technical representative for 4 hour to instruct Owners personnel responsible in operation and maintenance of the system.

END OF SECTION-

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SECTION 230000 SPACE HEATING UNITS

PART 1 GENERAL

1.1 SUMMARY

- A. This section includes units with integral Direct Gas-Fired heating for rooftop, outdoor installation. Airflow arrangement shall be Outdoor Air with Recirculation. Each unit shall be constructed in a horizontal configuration and shall incorporate additional product requirements as listed in Section 2 of this specification.
- B. Related sections include the following:
 - 1. 23-05-00 Common Work Results for HVAC
 - 2. 23 05 13 Common Motor Requirements for HVAC
 - 3. 23-05-48 Vibration and Seismic Control for HVAC Equipment
 - 4. 23-05-53 Identification for HVAC Piping and Equipment
 - 5. 23-05-94 Air Systems Testing Adjusting and Balancing for HVAC
 - 6. 23 07 00 Insulation for HVAC
 - 7. 23-09-93 Sequence of operation for HVAC Controls
 - 8. 23 11 23 Facility Natural Gas Piping
 - 9. 23 0000 Electrical

1.2 SUBMITTALS

- B. Product Data: For each type or model include the following:
 - 1. Complete fan performance curves for Supply Air, with system operating conditions indicated, as tested on an AMCA Certified Chamber.
 - 2. Sound performance data for Supply Air, as tested on an AMCA Certified chamber.
 - 3. Motor ratings, electrical characteristics and motor and fan accessories.
 - 4. Dimensioned drawings for each type of installation, showing isometric and plan views, to include location of attached ductwork and service clearance requirements.
 - 5. Estimated gross weight of each installed unit.
 - 6. Installation, Operating and Maintenance manual (IOM) for each model.
 - 7. Network interface Controller specifications to include available options and operating protocols. Include complete data on all factory-supplied input devices.
 - 8. Remote Panel description to include all functions

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain unit with Integral Heating with all appurtenant components or accessories from a single manufacturer.
- B. Product Options: Drawings must indicate size, profiles and dimensional requirements of unit and are to be based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- C. Certifications
 - 1. Entire unit shall be ETL Certified per ANSI Z83.4 or ANSI Z83.18 and bear an ETL mark.
 - 2. Coils shall be Recognized Components per UL 1995, CAN / CSA C22.2 No 236.05. Coil performance shall be calculated in accordance with AHRI 410.

1.4 COORDINATION

- A. Coordinate size and location of all building penetrations required for installation of each SHU and associated ducting, plumbing and electrical systems.

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- B. Coordinate sequencing of construction of associated plumbing, HVAC and electrical supply, roofing contractor.

1.5 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. Filters: 1 set of 2" thick MERV 8 disposable pleated filters for each unit.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with specifications contained within this document, manufacturers offering products that may be incorporated into the work include, but are not limited to:
 - 1. Greenheck
 - 2. Cambridge Air Solutions
 - 3. Reznor HVAC
 - 4. Substitutions: Permitted.

2.2 MANUFACTURED UNITS

- A. Unit with Integral Heating shall be fully assembled at the factory and consist of an insulated metal cabinet, outdoor air intake weather hood with aluminum mesh filter, motorized intake damper, and motorized recirculating damper, sensors, curb assembly, service receptacle, freeze protection, filter assembly for intake air, supply air blower assembly and an electrical control center. All specified components and internal accessories factory installed and tested and prepared for single-point high voltage connection

2.3 CABINET

- A. Materials: single wall metal cabinet with fiberglass duct liner insulation fabricated to permit access to internal components for maintenance.
 - 1. Outside casing: Pre-painted components as supplied by the factory shall have polyester urethane paint on 18-gauge G60 galvaneal steel. Base rail is 12 gauge, galvanized (G90) steel.
 - 2. Internal assemblies: 24 gauge, galvanized (G90) steel except for motor supports which shall be minimum 14 gauge galvanized (G90) steel.
- B. Cabinet Insulation: Comply with NFPA 90A and NFPA 90B and erosion requirements of UL 181.
 - 1. Materials: Fiberglass insulation. If insulation other than fiberglass is used, it must also meet the Fire Hazard Classification shown below.
 - a. Thickness: 1 inch (25 mm)
 - b. Fire Hazard Classification: Maximum flame spread of 25 and smoke developed of 50, when tested in accordance with ASTM C 411.
 - c. Location and application:
 - (1) entire unit
 - d. Access panels: Unit shall be equipped with insulated, hinged access panels to provide easy access to all major components. Access panel finish and material shall match unit casing.
 - e. Supply Air blower assembly options:
 - (1) Direct-drive fan(s) Blower assembly shall consist of an electric motor and mixed flow plenum fan. Assembly shall be mounted on heavy gauge galvanized steel rails and further mounted on 1.125-inch-thick neoprene vibration isolators.
 - (2) Blower motor(s) shall be constant volume and controlled by a factory supplied VFD.

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- C. Control center / connections: unit shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections
- D. Direct Gas-Fired Burner:
 - 1. Unit shall be factory assembled, piped and wired. Direct gas-fired system will be 92% efficient while supplying a burner that is capable of providing 25:1 turndown. Unit will utilize a draw through design and incorporate adjustable burner baffles plates for field adjustments. Unit will have a pilot
 - 2. Burner construction shall consist of a cast aluminum burner manifold and 400 series stainless steel mixing plates. No air from the inside space shall be allowed to pass across the burner at any time. Flame sensing shall be provided by a [flame rod] [ultra-violet scanner]. [A flame safeguard display shall be included]. Burner control shall have a digital coded fault indicator capable of storing the last five faults.
 - 3. Shall be equipped for operation on natural gas with a maximum rated inlet gas pressure of 1/2 psi. An External Gas pressure regulator shall be provided by the factory.
 - 4. Burner control options to include the following:
 - a. Discharge temperature with room override.
 - 5. Shall include the following safety controls:
 - a. Manual Reset, High Limit Switch:
 - b. Dual safety shutoff valves shall be that do not exceed 120 VAC control signals.
 - c. FM global requirements: Include high and low gas pressure switches and visual indication gas valves-when applicable
- E. Motorized Inlet Air Damper: to be of low leakage type and shall be factory installed.
- F. Motorized Recirculating Air Damper designed to permit 80% recirculation of building air. Dampers shall be factory installed. Dampers shall be controlled by manual switch.
- G. Sensors are considered to be part of various optional operational modes or device controllers and are to be factory supplied and installed as specified.
- H. Curb Assembly: A curb assembly shall be made of galvanized steel provided by the factory for field assembly and installation as part of this division. The curb shall include a duct adapter(s) for supply air and return air. The installing contractor shall be responsible for coordinating with roofing contractor to ensure curb unit is properly flashed to provide protection against weather/moisture penetration. Contractor shall provide and install appropriate insulation for the curb assembly.

2.4 BLOWER-DD

- A. Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower and must have [neoprene vibration isolation devices, minimum of 1 – 1/8 inches thick]
- B. Fan: Mixed flow plenum fan statically and dynamically balanced.
- C. Blower section motor source quality control: Blower performance shall be factory tested for flow rate, pressure, power, air density, rotation speed and efficiency. Ratings are to be established in accordance with AMCA 210, "Laboratory Methods of Testing Fans for Rating."
- D. Proceed with installation only after all unsatisfactory conditions have been corrected.

2.5 MOTORS

- A. General: Blower motors greater than ¾ horsepower shall be "NEMA Premium™" unless otherwise indicated. Motors shall be heavy-duty, permanently lubricated type to match the fan load and furnished at the specified voltage, phase and enclosure.

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- B. Motors shall be 60 cycle, 3 phase 208 volts

2.6 UNIT CONTROLS

- A. The unit shall be constructed so that it can function as a stand-alone heating system controlled by factory-supplied remote panel, thermostats and sensors.
- B. Unit shall incorporate a microprocessor controller with integral LCD screen that provides text readouts of status, operating settings and alarm conditions. The Microprocessor controller shall have a built-in keypad to permit operator to access read-out screens and change settings without the use of ancillary equipment, devices or software. DDC controllers that require the use of equipment or software that is not factory-installed in the unit are not acceptable. Alarm readouts consisting of flashing light codes are not acceptable.
 - 1. Operating protocol: The microprocessor controller shall be supplied with a protocol card for BACnet MSTP.
- C. Variable Frequency Drive (VFD): unit shall have factory installed variable frequency drive for operation of the blower motor. The VFDs shall be factory-programmed for unit-specific requirements and shall not require additional field programming to operate.
- D. Sensors to be provided with the unit
 - 1. Room / Space Temperature Sensors
 - 2. Heating Inlet Air Sensor]
 - 3. Dirty Filter Sensor
 - 4. Fire Stat Type III
 - 5. Flame sensing and flame safeguard
 - 6. 120V/24V Smoke Detector

2.7 FILTERS

- A. Unit shall have 2" thick MERV 8 disposable pleated filters following the outdoor air intake in a V-bank arrangement and shall be accessible from the exterior of the unit.

PART 3 3. EXECUTION

3.1 EXAMINATION

- A. Prior to start of installation, examine area and conditions to verify correct location for compliance with installation tolerances and other conditions affecting unit performance. See unit IOM.
- B. Examine roughing-in of plumbing, electrical and HVAC services to verify actual location and compliance with unit requirements. See unit IOM.

3.2 INSTALLATION

- A. Installation shall be accomplished in accordance with these written specifications, project drawings, manufacturer's installation instructions as documented in manufacturer's IOM, Best Practices and all applicable building codes.

3.3 CONNECTIONS

- A. In all cases, industry Best Practices shall be incorporated. Connections are to be made subject to the installation requirements shown above.
 - 1. Piping installation requirements are specified in Division 22 (Plumbing). Drawings indicate general arrangement of piping, fittings and specialties.

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2. Duct installation and connection requirements are specified in Division 23 of this document.
3. Electrical installation requirements are specified in Division 26 of this document.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory authorized service representative to inspect field assembled components and equipment installation, to include electrical and piping connections. Report results to A/E in writing. Inspection must include a complete startup checklist to include (as a minimum) the following:
 1. Completed Start-Up Checklists as found in manufacturer's IOM.

3.5 START-UP SERVICE

- A. Engage a factory authorized service representative to perform startup service. Clean entire unit, comb coil fins as necessary, and install clean filters. Verify water source for compliance with manufacturer's requirements for flow and temperature. Measure and record electrical values for voltage and amperage. Refer to Division 23 "Testing, Adjusting and Balancing" and comply with provisions therein.

3.6 DEMONSTRATION AND TRAINING

- A. Engage a factory authorized service representative to train owner's maintenance personnel to adjust, operate and maintain the entire unit. Refer to Division 01 Section Closeout Procedures and Demonstration and Training.

END OF SECTION 23 75 23

- NOTES:
1. SHEETMETAL CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
 2. DUCT SIZES GIVEN ARE NET INTERIOR DIMENSIONS SHEETMETAL CONTRACTOR TO ALLOW FOR LINING WHERE REQUIRED.
 3. SEE SHEET M-001 FOR HVAC LEGEND
 4. SEE SHEET M-601 FOR HVAC SCHEDULES.
 5. USE FLEXIBLE CONNECTOR AT ALL CONNECTIONS TO MECHANICAL EQUIPMENT
 6. USE FLEXIBLE CONNECTOR AT ALL CONNECTIONS TO AIR DISTRIBUTION DEVICES.
 7. CONTRACTOR TO COORDINATE DUCTWORK TO RUN BETWEEN FLOOR JOISTS
 8. CONTRACTOR TO COORDINATE DUCTWORK WITH STRUCTURAL STEEL CONTRACTOR TO PROVIDE COORDINATED MODEL WITH SHOP DRAWINGS TO DEMONSTRATE COORDINATION WITH STRUCTURE PRIOR TO FABRICATION OF DUCTWORK.



A New Construction Project:
MSCCM - Ellis Theater Renovation

Project Site Address:
311 Byrd Avenue
Philadelphia, MS
39350

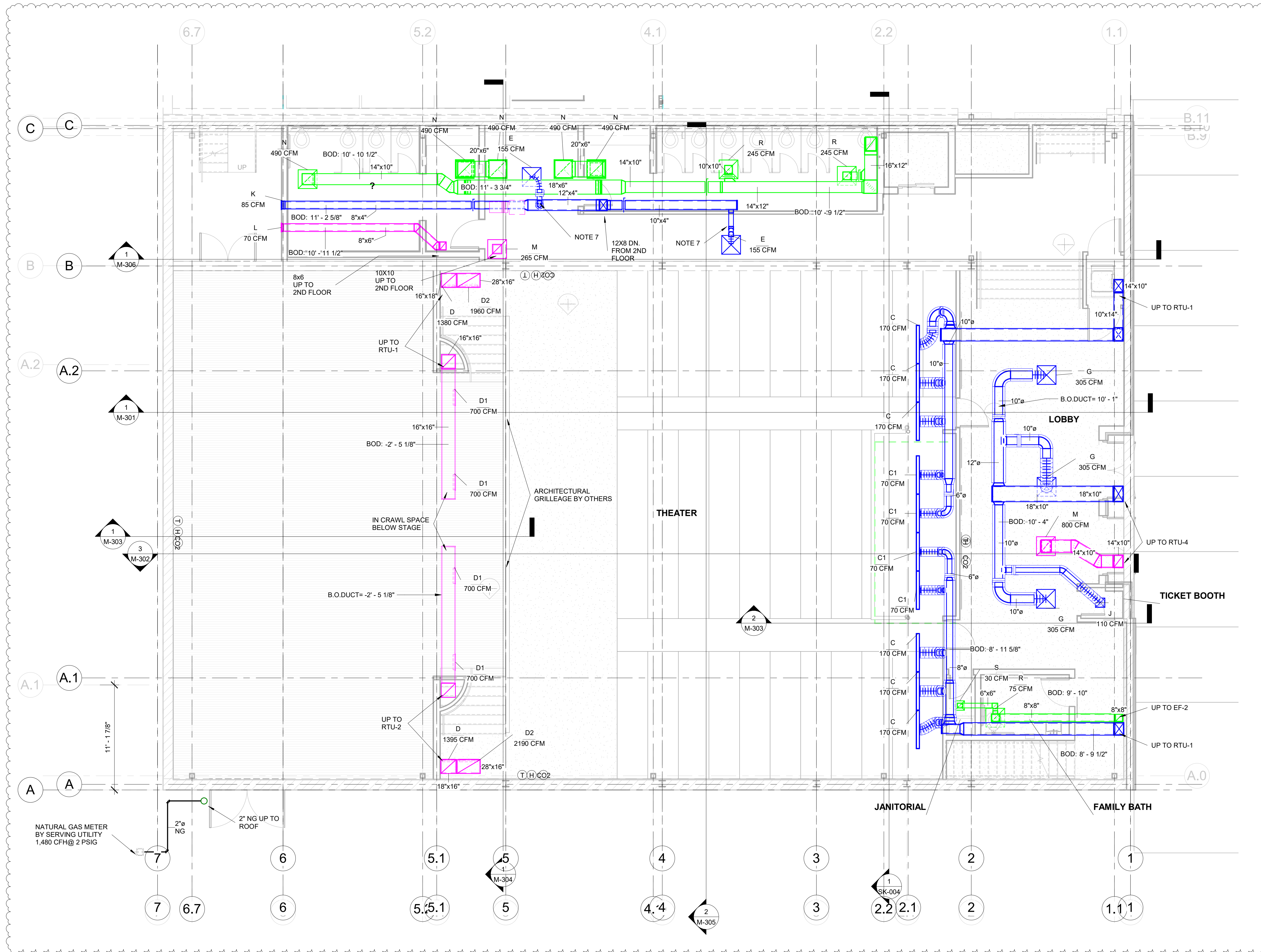
DAAD Project Number:
17583

No:	SET:	DATE:
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02	REVISED ROOTOP EQUIPMENT, DUCT	10-13-21

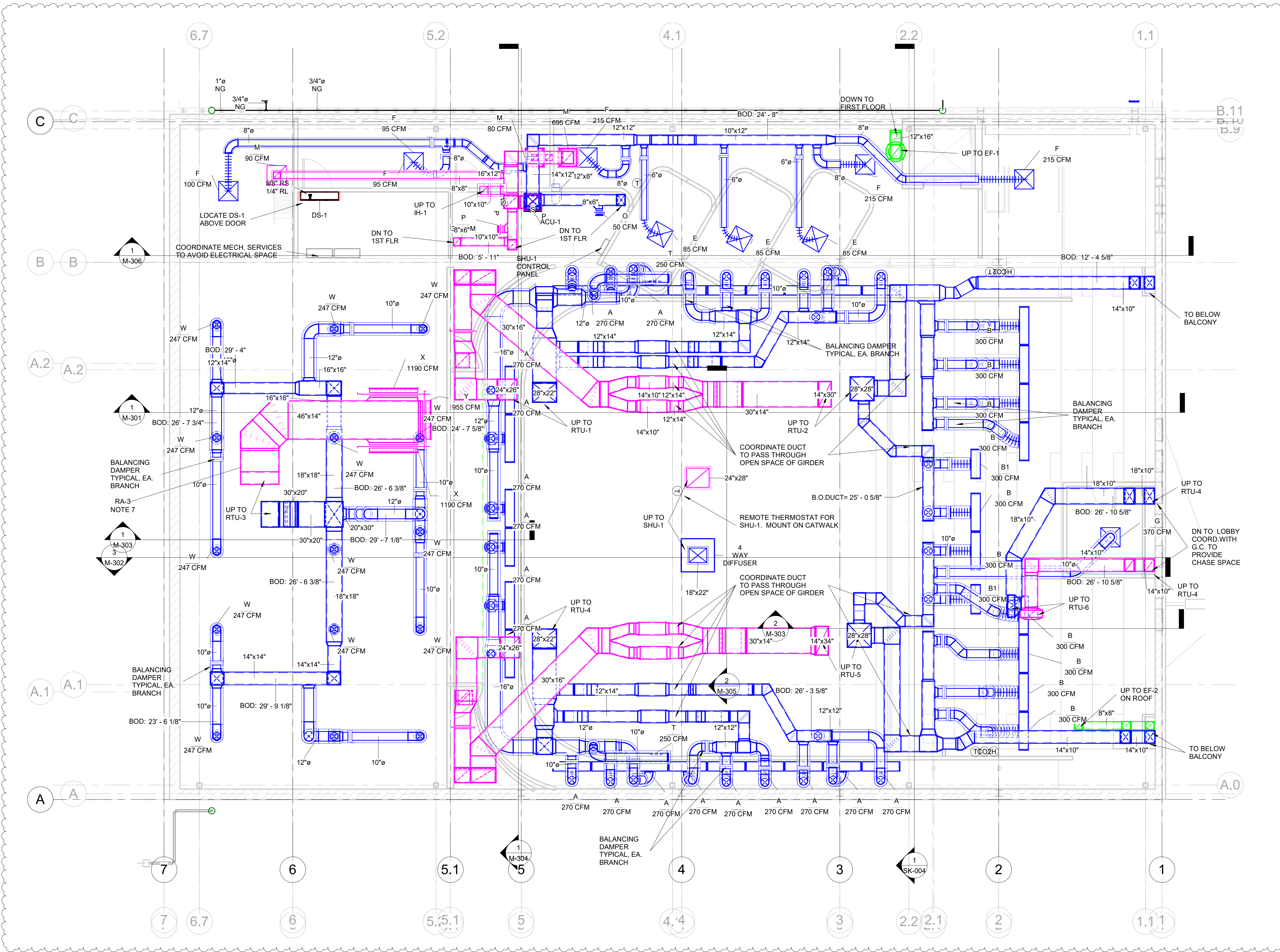
Drawing:

FIRST FLOOR HVAC PLAN

M-101



1 LOBBY AND PNC FIRST FLOOR HVAC PLAN
3/16" = 1'-0"



- NOTES:
1. SHEETMETAL CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
 2. DUCT SIZES GIVEN ARE NET INTERIOR DIMENSIONS SHEETMETAL CONTRACTOR TO ALLOW FOR LINING WHERE REQUIRED.
 3. SEE SHEET M-001 FOR HVAC LEGEND
 4. SEE SHEET M-601 FOR HVAC SCHEDULES.
 5. USE FLEXIBLE CONNECTOR AT ALL CONNECTIONS TO MECHANICAL EQUIPMENT
 6. USE FLEXIBLE CONNECTOR AT ALL CONNECTIONS TO AIR DISTRIBUTION DEVICES.
 7. RA-3 - RETURN AIR SOUND ATTENUATOR ON RTU-3 SEE SCHEDULE ON SHEET M-601.
 8. CONTRACTOR TO COORDINATE DUCTWORK WITH STRUCTURAL STEEL. CONTRACTOR TO PROVIDE COORDINATED MODEL WITH SHOP DRAWINGS TO DEMONSTRATE COORDINATION WITH STRUCTURE PRIOR TO FABRICATION OF DUCTWORK.



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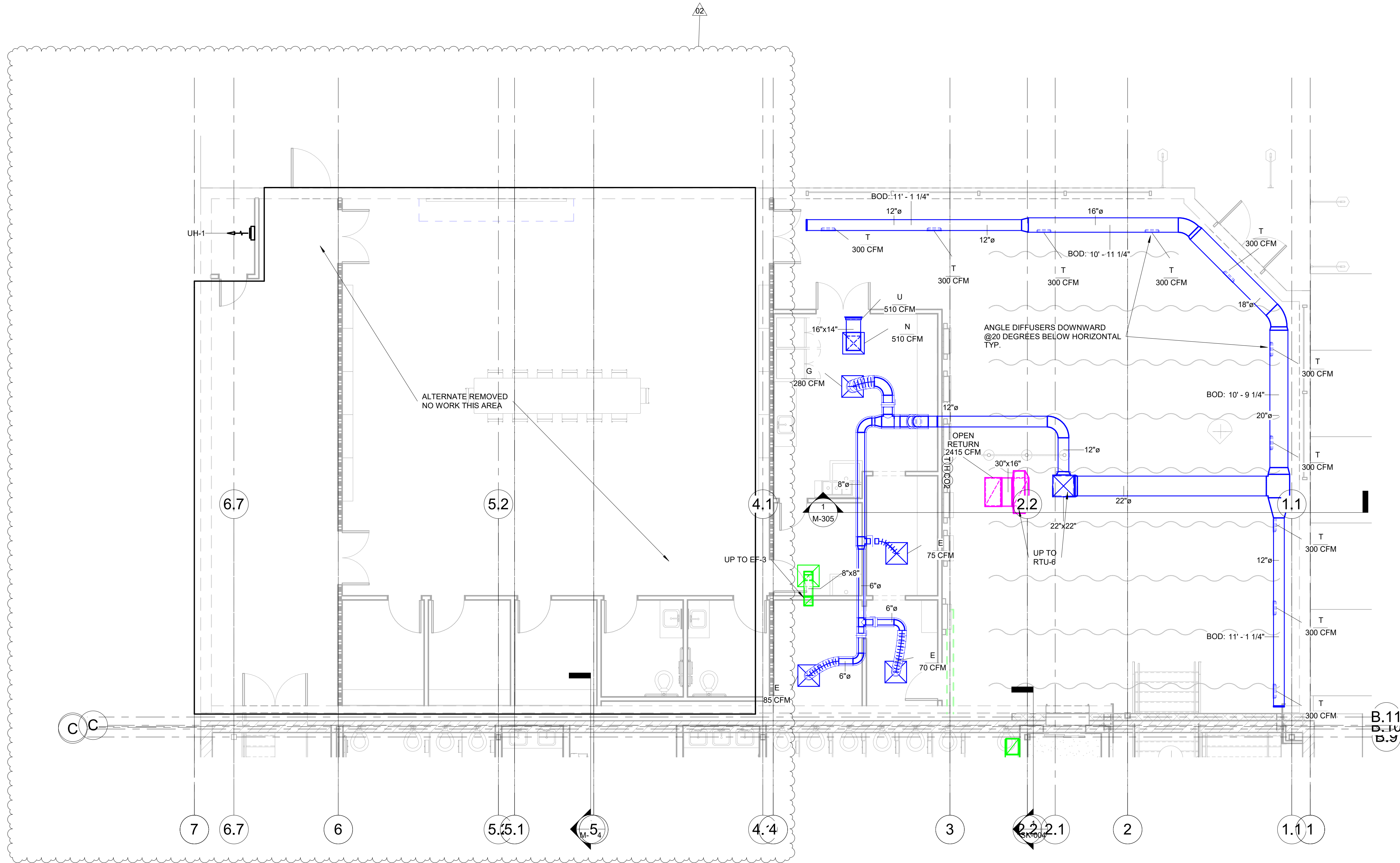
No:	SET:	DATE:
01	CD SET	7-23-21
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1 PNC 2ND FLOOR
3/16" = 1'-0"

Drawing:
PNC SECOND FLOOR
HVAC PLAN

M-102

- NOTES:
1. SHEETMETAL CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
 2. DUCT SIZES GIVEN ARE NET INTERIOR DIMENSIONS SHEETMETAL CONTRACTOR TO ALLOW FOR LINING WHERE REQUIRED.
 3. SEE SHEET M-001 FOR HVAC LEGEND
 4. SEE SHEET M-601 FOR HVAC SCHEDULES.
 5. RECTANGULAR DUCTWORK FROM UNIT CONNECTION TO ROUND DUCT CONNECTION IS TO BE INTERNALLY LINED FOR SOUND ATTENUATION.
 6. ROUND SUPPLY DUCTWORK IN EXPOSED LOCATIONS SHALL BE OF DOUBLE WALL CONSTRUCTION.
 7. USE FLEXIBLE CONNECTOR AT ALL CONNECTIONS TO MECHANICAL EQUIPMENT
 8. USE FLEXIBLE CONNECTOR AT ALL CONNECTIONS TO AIR DISTRIBUTION DEVICES.
 9. MECHANICAL CONTRACTOR TO COORDINATE UNIT PLACEMENT AND ROOF OPENING WITH STRUCTURAL ENGINEER.



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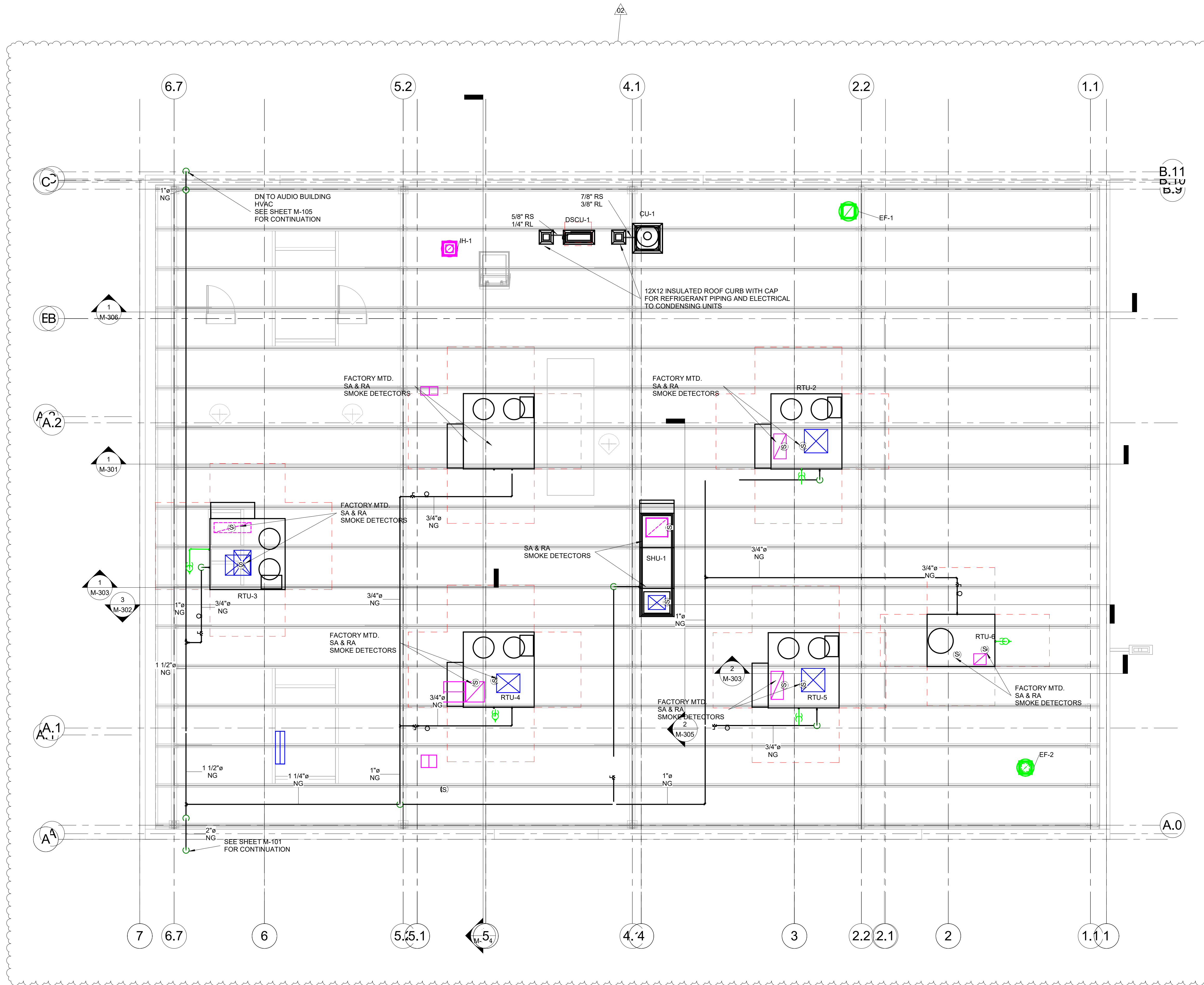
No:	SET:	DATE:
01	CD SET	7-23-21
02	REVISED ROOTOP EQUIPMENT, DUCT	10-13-21

1 AUDIO BUILDING HVAC PLAN
3/16" = 1'-0"

Drawing:
AUDIO BUILDING HVAC
PLAN

M-103

- NOTES:
1. SHEETMETAL CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
2. DUCT SIZES GIVEN ARE NET INTERIOR DIMENSIONS SHEETMETAL CONTRACTOR TO ALLOW FOR LINING WHERE REQUIRED.
3. RECTANGULAR DUCTWORK FROM UNIT CONNECTION TO ROUND DUCT CONNECTION IS TO BE INTERNALLY LINED FOR SOUND ATTENUATION.



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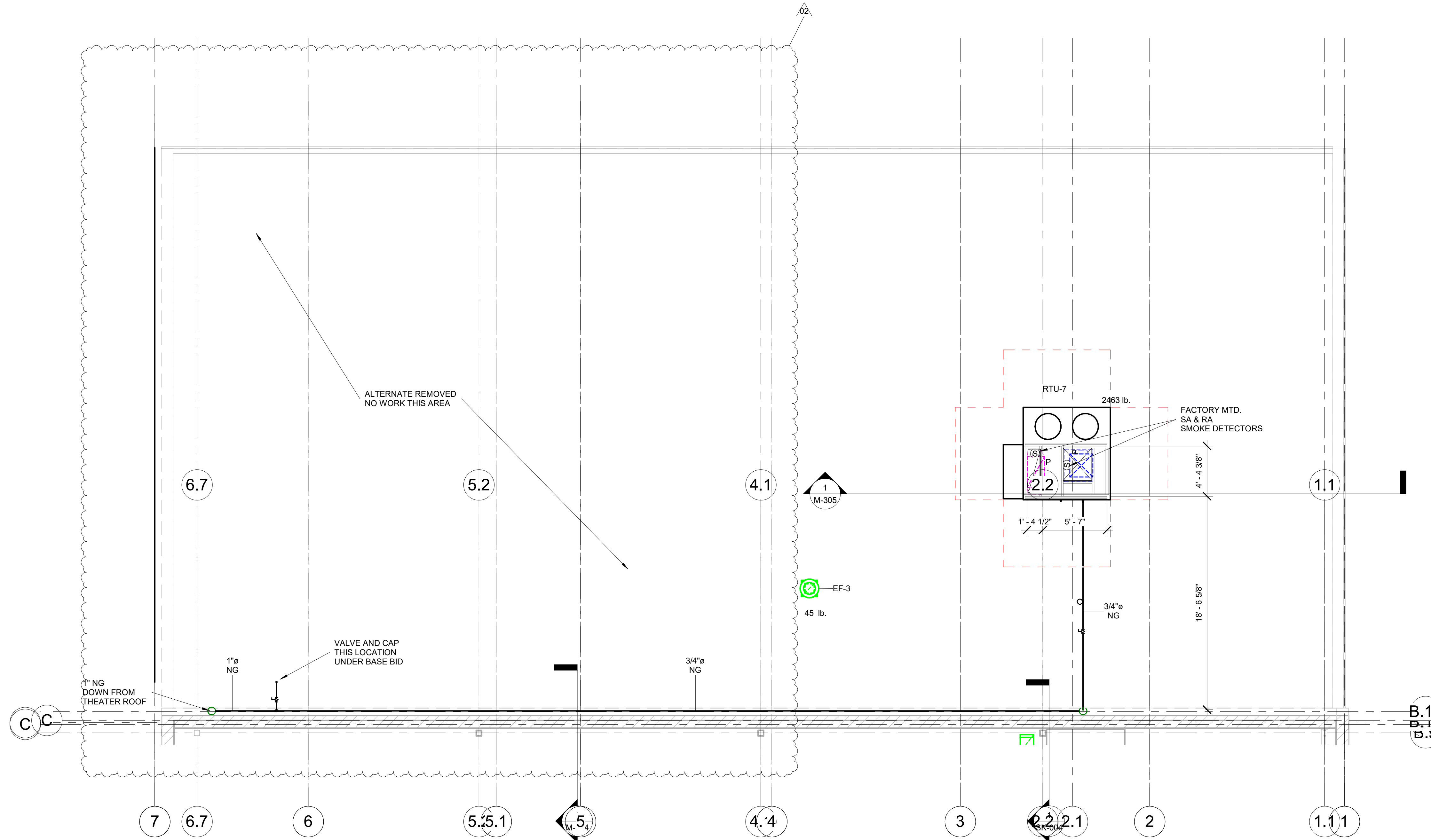
Drawing:

THEATER ROOF PLAN

M-104

1 ROOF PLAN
3/16" = 1'-0"

- NOTES:
1. SHEETMETAL CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
 2. DUCT SIZES GIVEN ARE NET INTERIOR DIMENSIONS SHEETMETAL CONTRACTOR TO ALLOW FOR LINING WHERE REQUIRED.
 3. SEE SHEET M-001 FOR HVAC LEGEND
 4. SEE SHEET M-001 FOR HVAC SCHEDULES.
 5. RECTANGULAR DUCTWORK FROM UNIT CONNECTION TO ROUND DUCT CONNECTION IS TO BE INTERNALLY LINED FOR SOUND ATTENUATION.
 6. ROUND SUPPLY DUCTWORK IN EXPOSED LOCATIONS SHALL BE OF DOUBLE WALL CONSTRUCTION.
 7. USE FLEXIBLE CONNECTOR AT ALL CONNECTIONS TO MECHANICAL EQUIPMENT
 8. USE FLEXIBLE CONNECTOR AT ALL CONNECTIONS TO AIR DISTRIBUTION DEVICES.



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01	CD SET	7-23-21
02	REVISED ROOTOP EQUIPMENT, DUCT	10-13-21

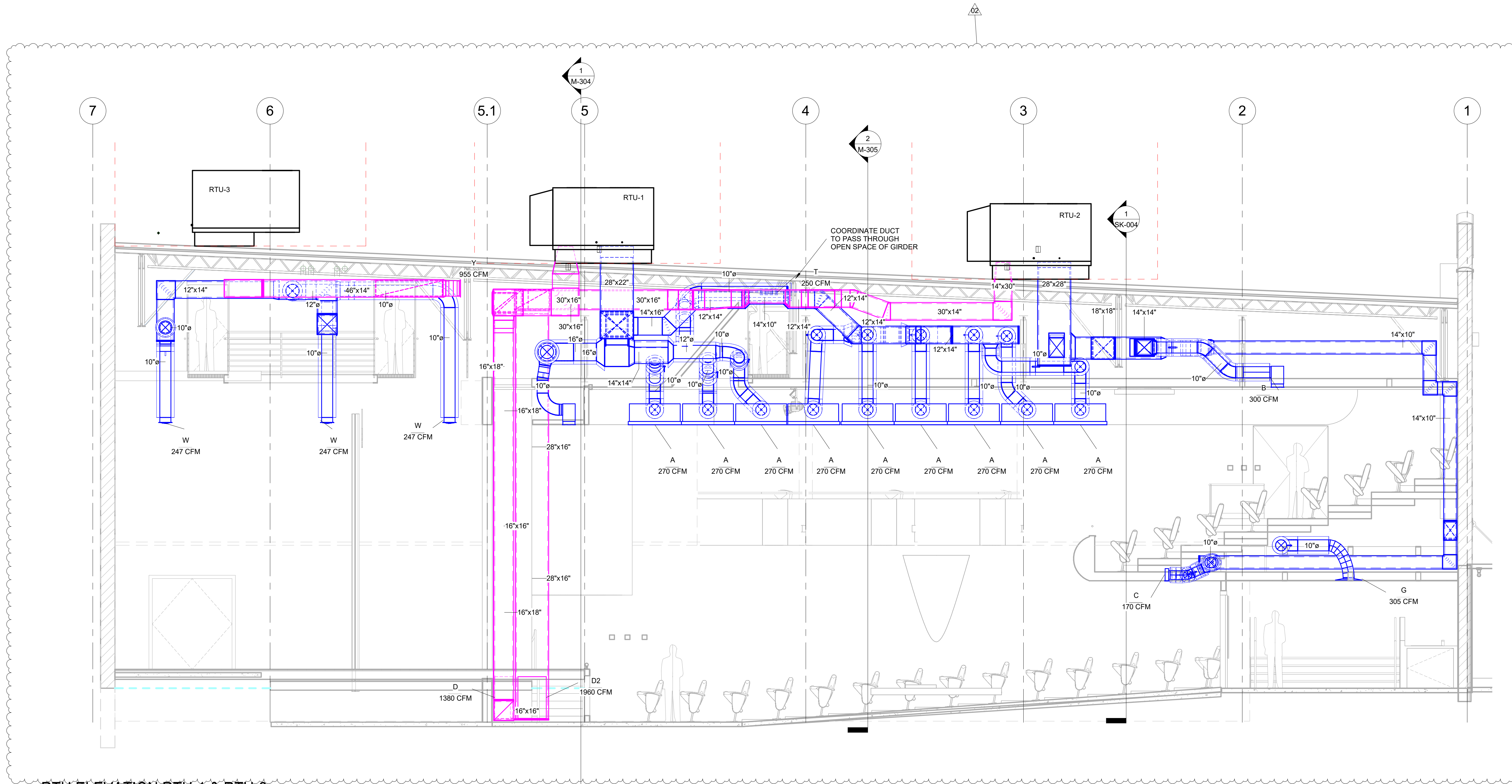
1 AUDIO BUILDING ROOF PLAN
 3/16" = 1'-0"

Drawing:

AUDIO BUILDING ROOF PLAN

M-105

- NOTES:
1. SHEETMETAL CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
 2. DUCT SIZES GIVEN ARE NET INTERIOR DIMENSIONS SHEETMETAL CONTRACTOR TO ALLOW FOR LINING WHERE REQUIRED.
 3. SEE SHEET M-001 FOR HVAC LEGEND
 4. SEE SHEET M-601 FOR HVAC SCHEDULES
 5. SEE SHEET M-701 FOR HVAC DETAILS
 6. RECTANGULAR DUCTWORK FROM UNIT CONNECTION TO ROUND DUCT CONNECTION IS TO BE INTERNALLY LINED FOR SOUND ATTENUATION.



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01	CD SET	7-23-21
02	REVISED ROOTOP EQUIPMENT, DUCT	10-13-21

Drawing:

ELEVATIONS

M-301

1 RTU ELEVATION RTU-1 & RTU-2
1/4" = 1'-0"

- NOTES:
1. SHEETMETAL CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
 2. DUCT SIZES GIVEN ARE NET INTERIOR DIMENSIONS SHEETMETAL CONTRACTOR TO ALLOW FOR LINING WHERE REQUIRED.
 3. SEE SHEET M-001 FOR HVAC LEGEND
 4. SEE SHEET M-601 FOR HVAC SCHEDULES
 5. RECTANGULAR DUCTWORK FROM UNIT CONNECTION TO ROUND DUCT CONNECTION IS TO BE INTERNALLY LINED FOR SOUND ATTENUATION.



A New Construction Project:
MSCCM - Ellis Theater Renovation

Project Site Address:
311 Byrd Avenue
Philadelphia, MS
39350

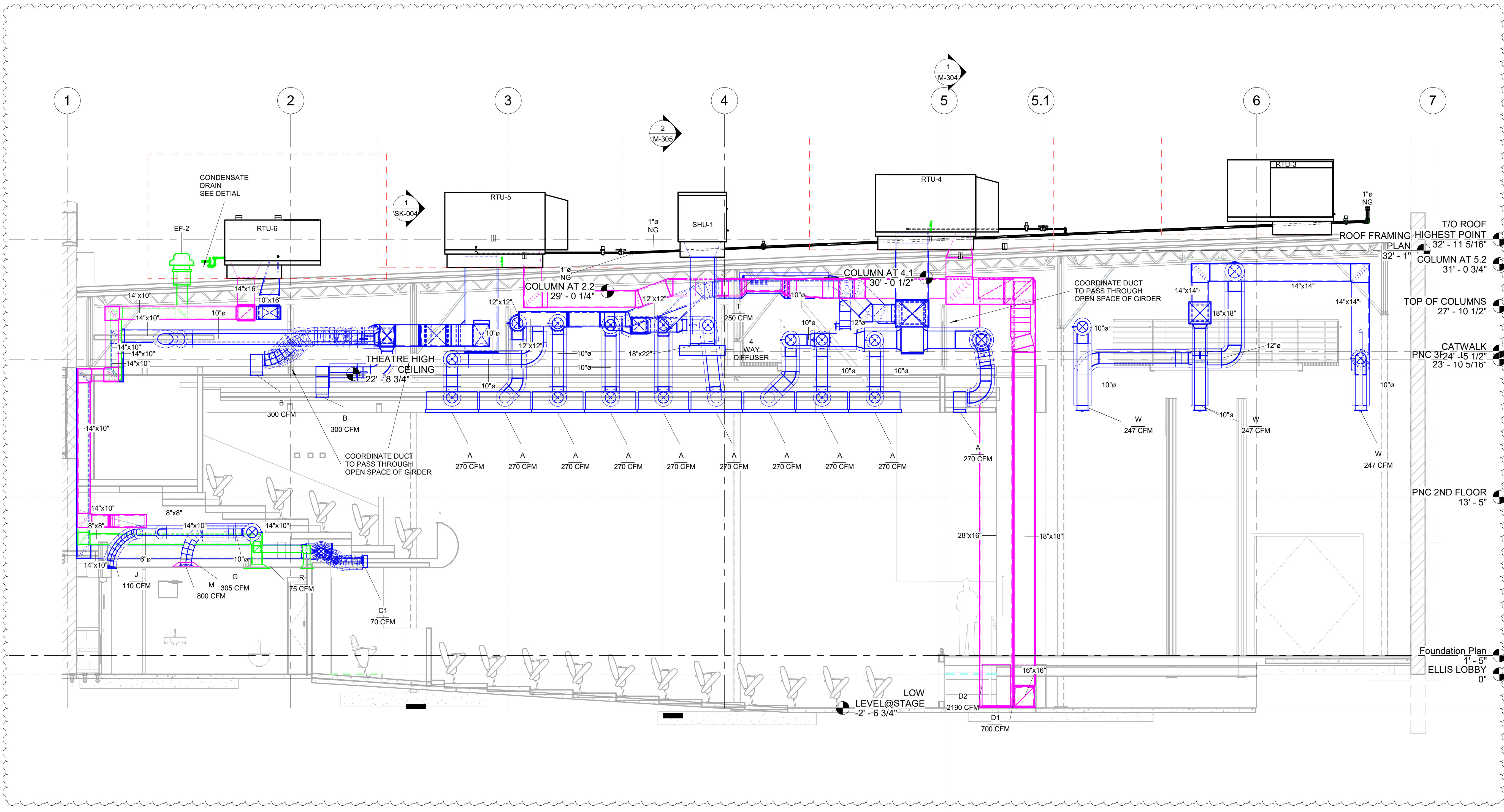
DAAD Project Number:
17583

No:	SET:	DATE:
01	CD SET	7-23-21
02	REVISED ROOTOP EQUIPMENT, DUCT	10-13-21

Drawing:

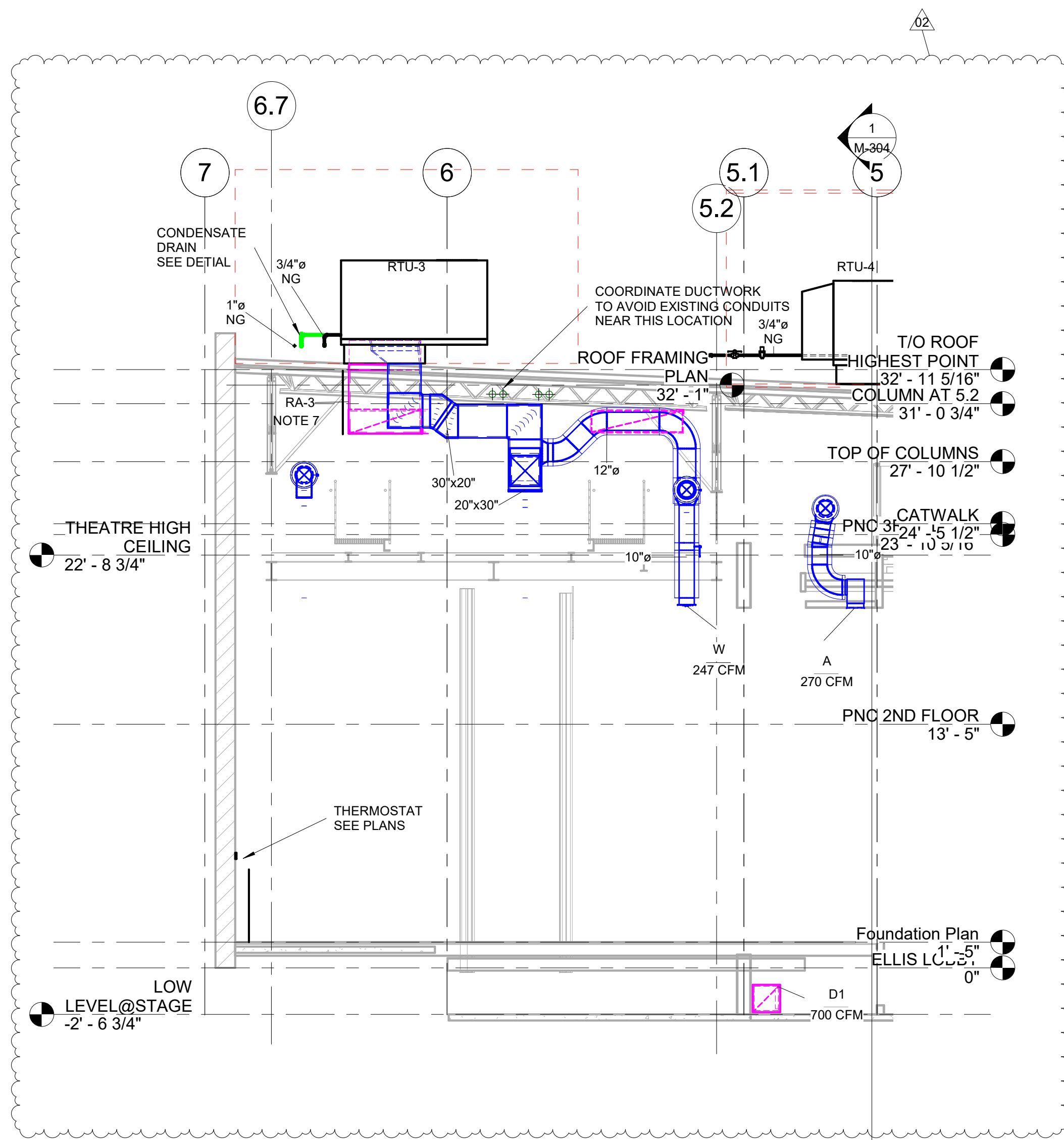
ELEVATIONS

M-302

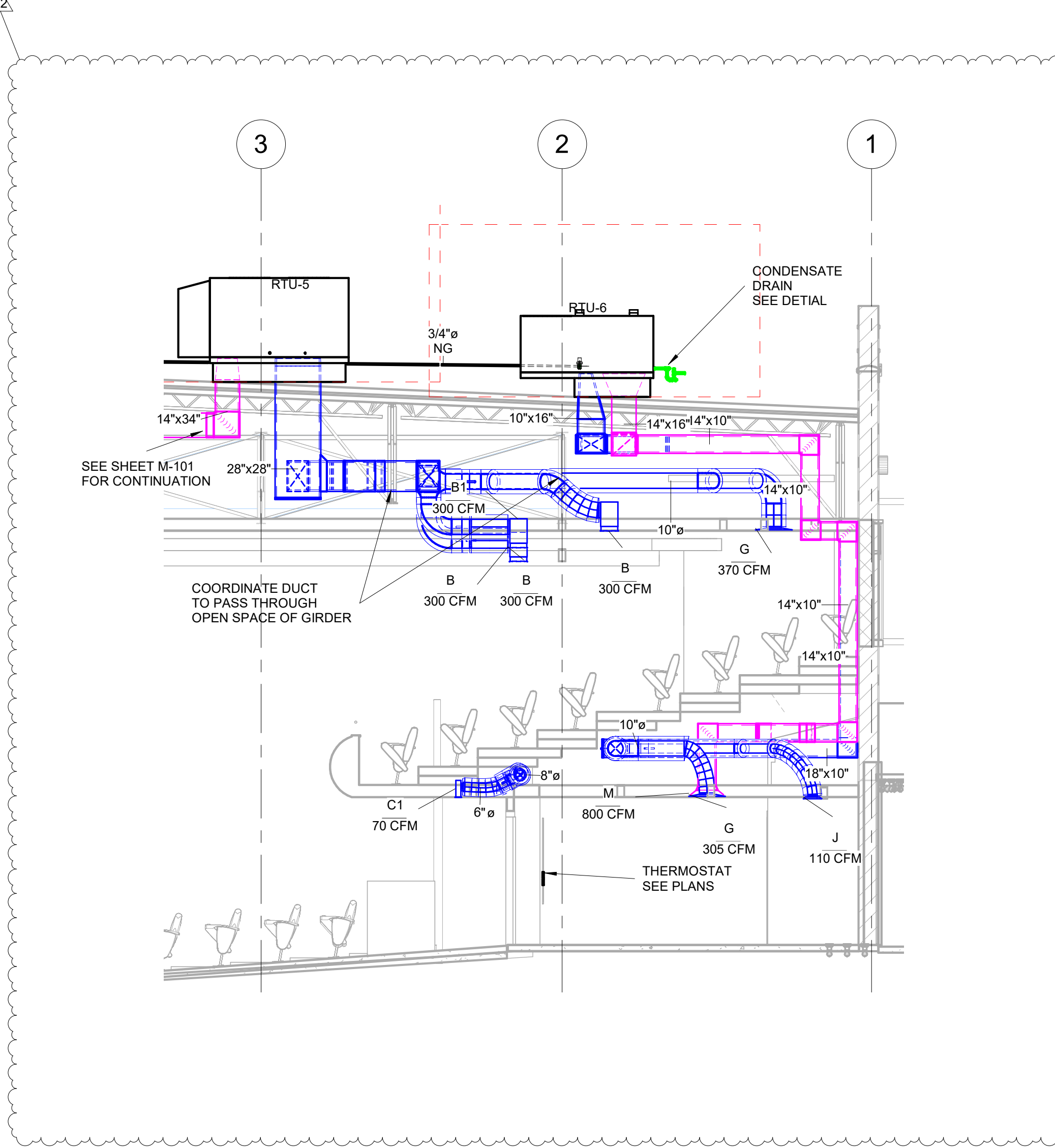


3 RTU ELEVATION RTU-4 & RTU-5
1/4" = 1'-0"

- NOTES:
1. SHEETMETAL CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
 2. DUCT SIZES GIVEN ARE NET INTERIOR DIMENSIONS SHEETMETAL CONTRACTOR TO ALLOW FOR LINING WHERE REQUIRED.
 3. SEE SHEET M-001 FOR HVAC LEGEND
 4. SEE SHEET M-601 FOR HVAC SCHEDULES.
 5. USE FLEXIBLE CONNECTOR AT ALL CONNECTIONS TO MECHANICAL EQUIPMENT
 6. USE FLEXIBLE CONNECTOR AT ALL CONNECTIONS TO AIR DISTRIBUTION DEVICES.
 7. RA-3 - RETURN AIR SOUND ATTENUATOR ON RTU-3 SEE SCHEDULE ON SHEET M-601.



1 RTU-3 ELEVATION
3/16" = 1'-0"



2 RTU-6 ELEVATION
3/16" = 1'-0"



A New Construction Project:
MSCCM - Ellis Theater Renovation

Project Site Address:
311 Byrd Avenue
Philadelphia, MS
39350

DAAD Project Number:
17583

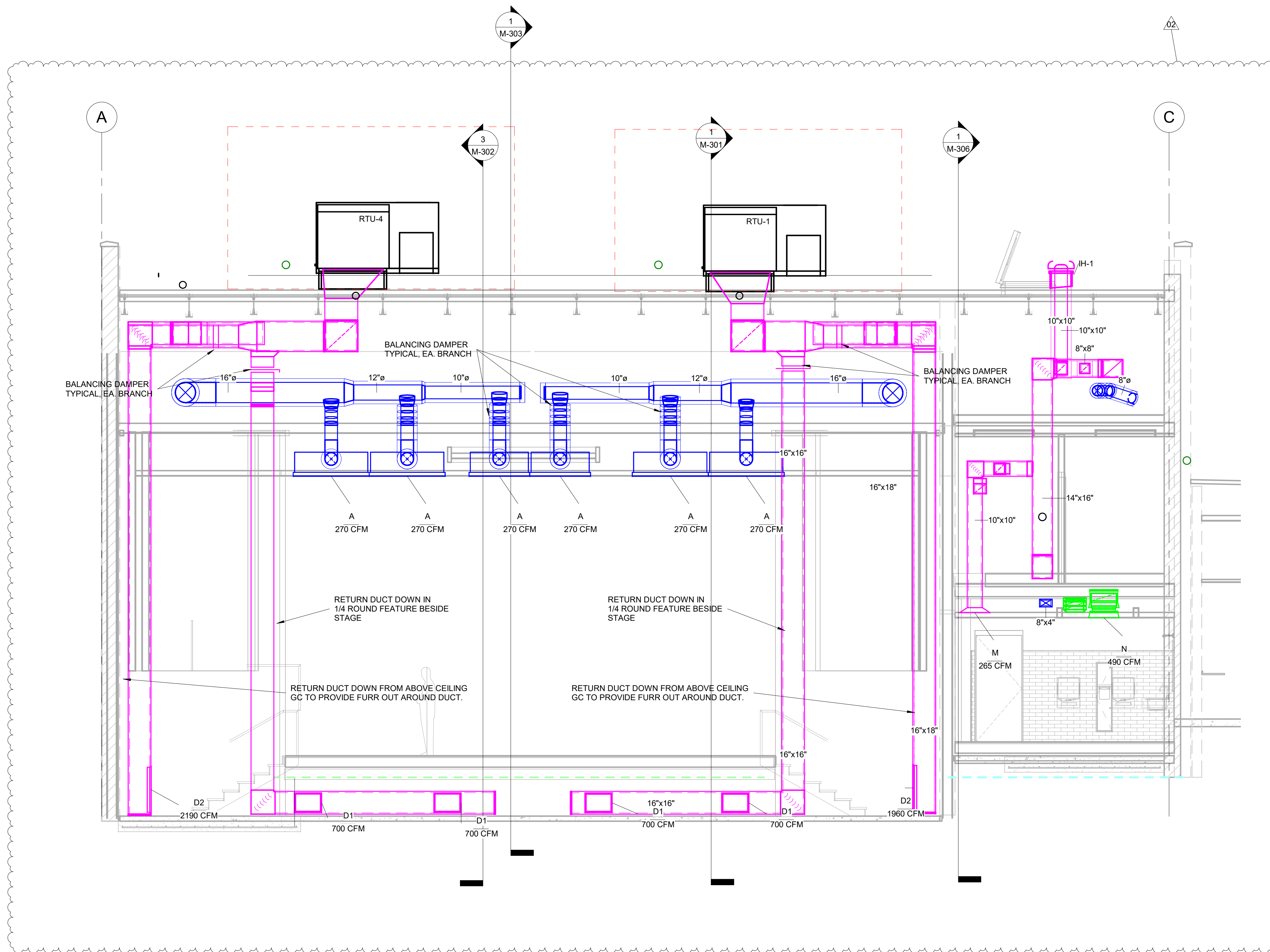
No:	SET:	DATE:
01	CD SET	7-23-21
02	REVISED ROOTOP EQUIPMENT, DUCT	10-13-21

Drawing:

ELEVATIONS

M-303

- NOTES:
1. SHEETMETAL CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
 2. DUCT SIZES GIVEN ARE NET INTERIOR DIMENSIONS SHEETMETAL CONTRACTOR TO ALLOW FOR LINING WHERE REQUIRED.
 3. SEE SHEET M-001 FOR HVAC LEGEND
 4. SEE SHEET M-601 FOR HVAC SCHEDULES.
 5. USE FLEXIBLE CONNECTOR AT ALL CONNECTIONS TO MECHANICAL EQUIPMENT
 6. USE FLEXIBLE CONNECTOR AT ALL CONNECTIONS TO AIR DISTRIBUTION DEVICES.
 7. COORDINATE DUCTWORK TO RUN BETWEEN FLOOR JOISTS.



A New Construction Project:
MSCCM - Ellis Theater Renovation

Project Site Address:
311 Byrd Avenue
Philadelphia, MS
39350

DAAD Project Number:
17583

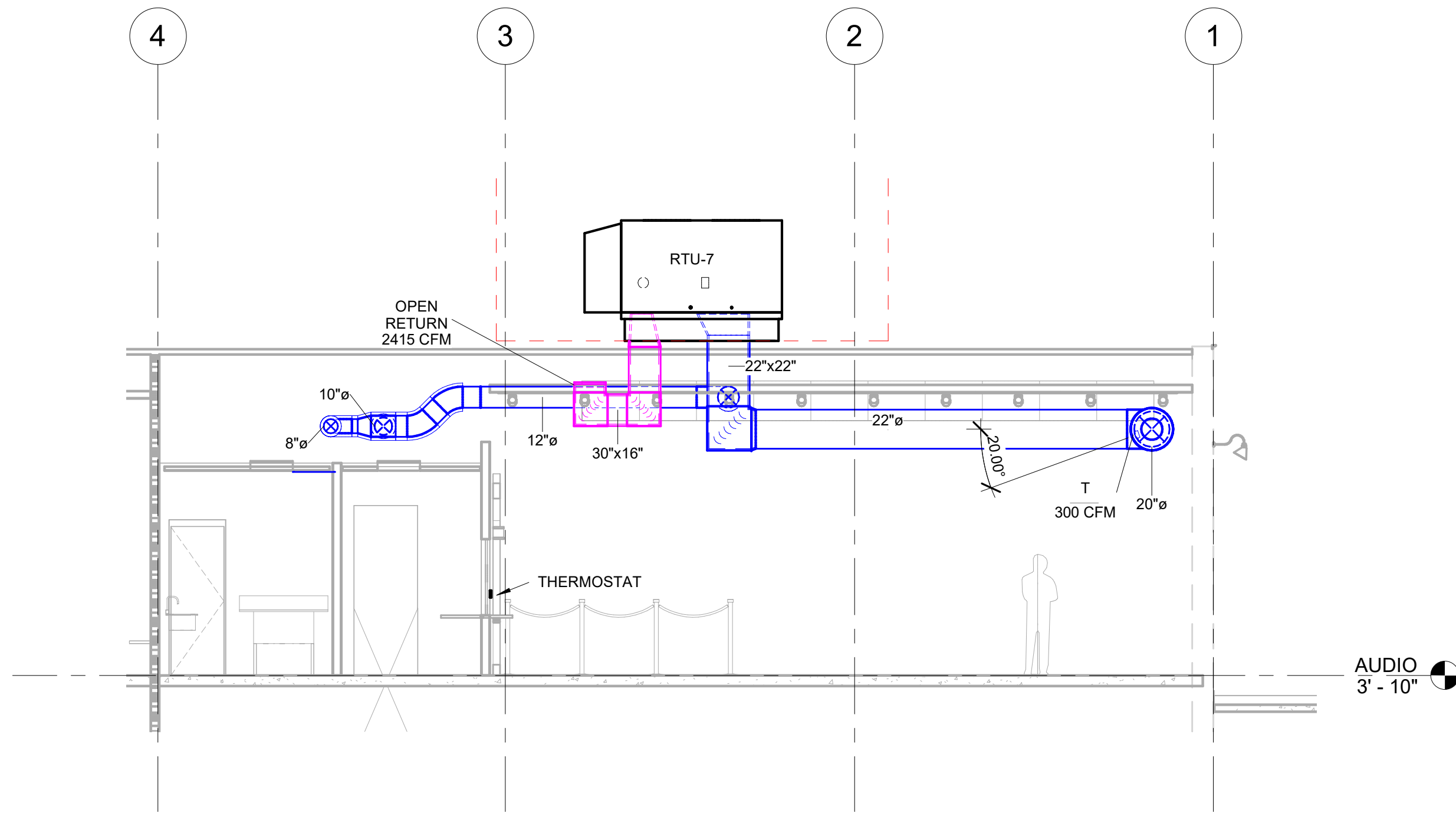
No: 02 SET: REVISED ROOFTOP EQUIPMENT, DUCT DATE: 10-13-21

1 ELEVATION AT STAGE
1/4" = 1'-0"

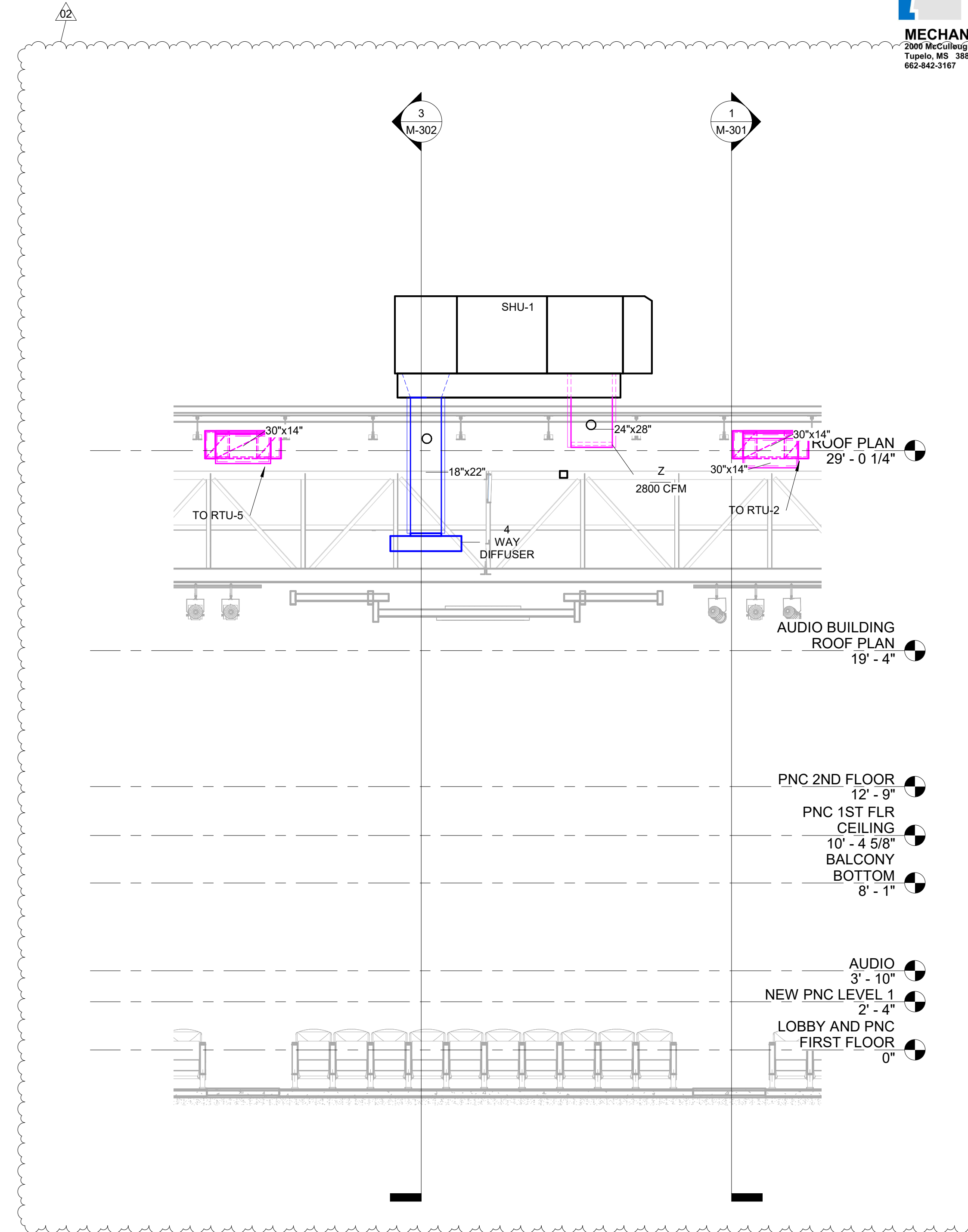
Drawing:

ELEVATION AT STAGE

M-304



1 RTU-7 ELEVATION
3/16" = 1'-0"



2 SHU-1 ELEVATION
1/4" = 1'-0"



ALTERNATE REMOVED



A New Construction Project:

**MSCCM -
Ellis Theater
Renovation**

Project Site Address:

311 Byrd Avenue
Philadelphia, MS
39350

DAAD Project Number:

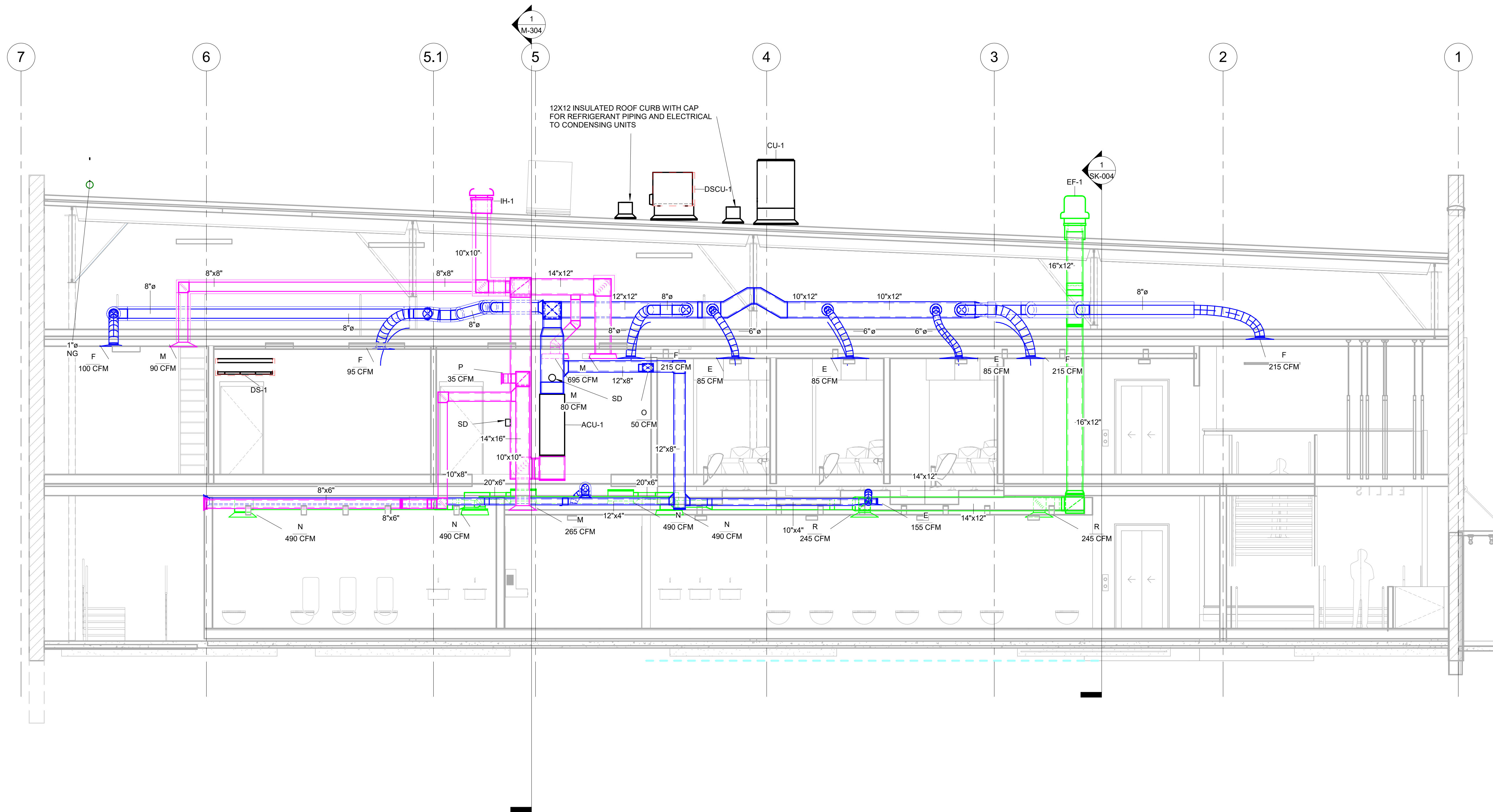
17583

No:	SET:	DATE:
01	CD SET	7-23-21
02	REVISED ROOTOP EQUIPMENT, DUCT	10-13-21

Drawing:

ELEVATIONS

M-305



A New Construction Project:
MSCCM - Ellis Theater Renovation

Project Site Address:
 311 Byrd Avenue
 Philadelphia, MS
 39350

DAAD Project Number:
 17583

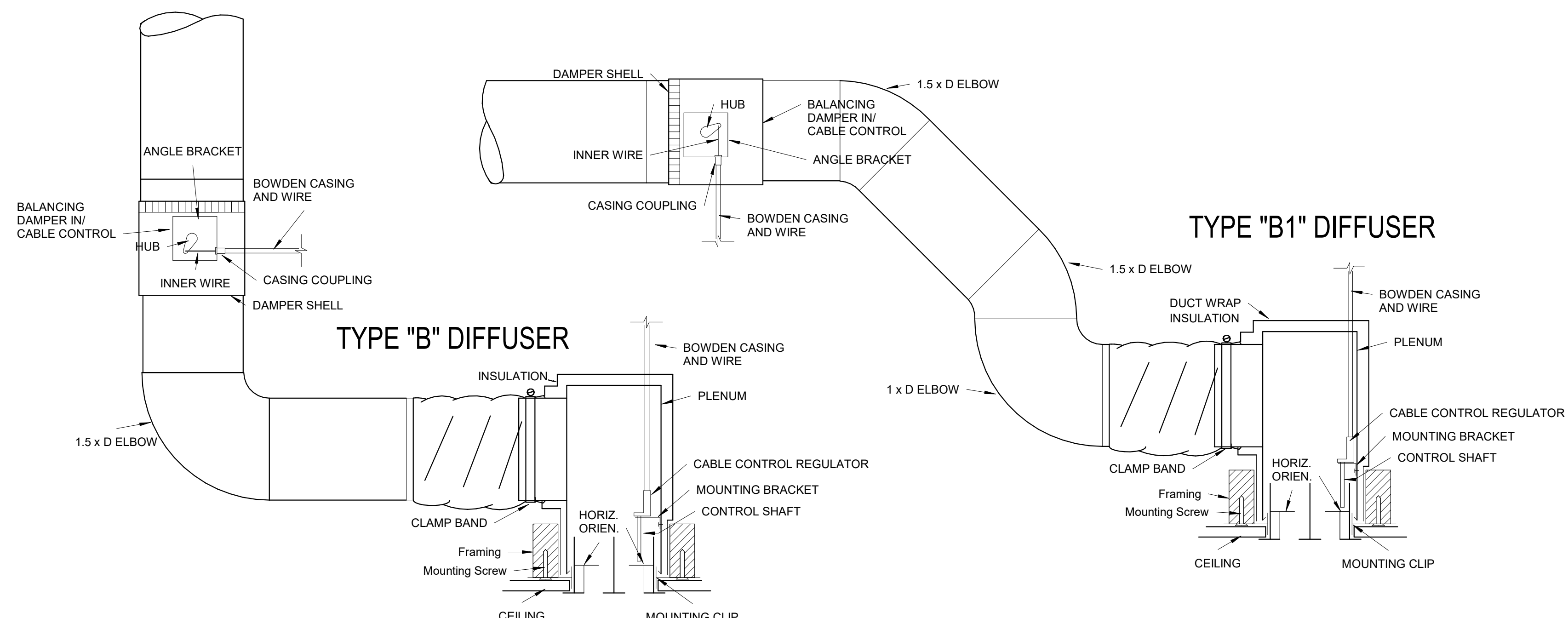
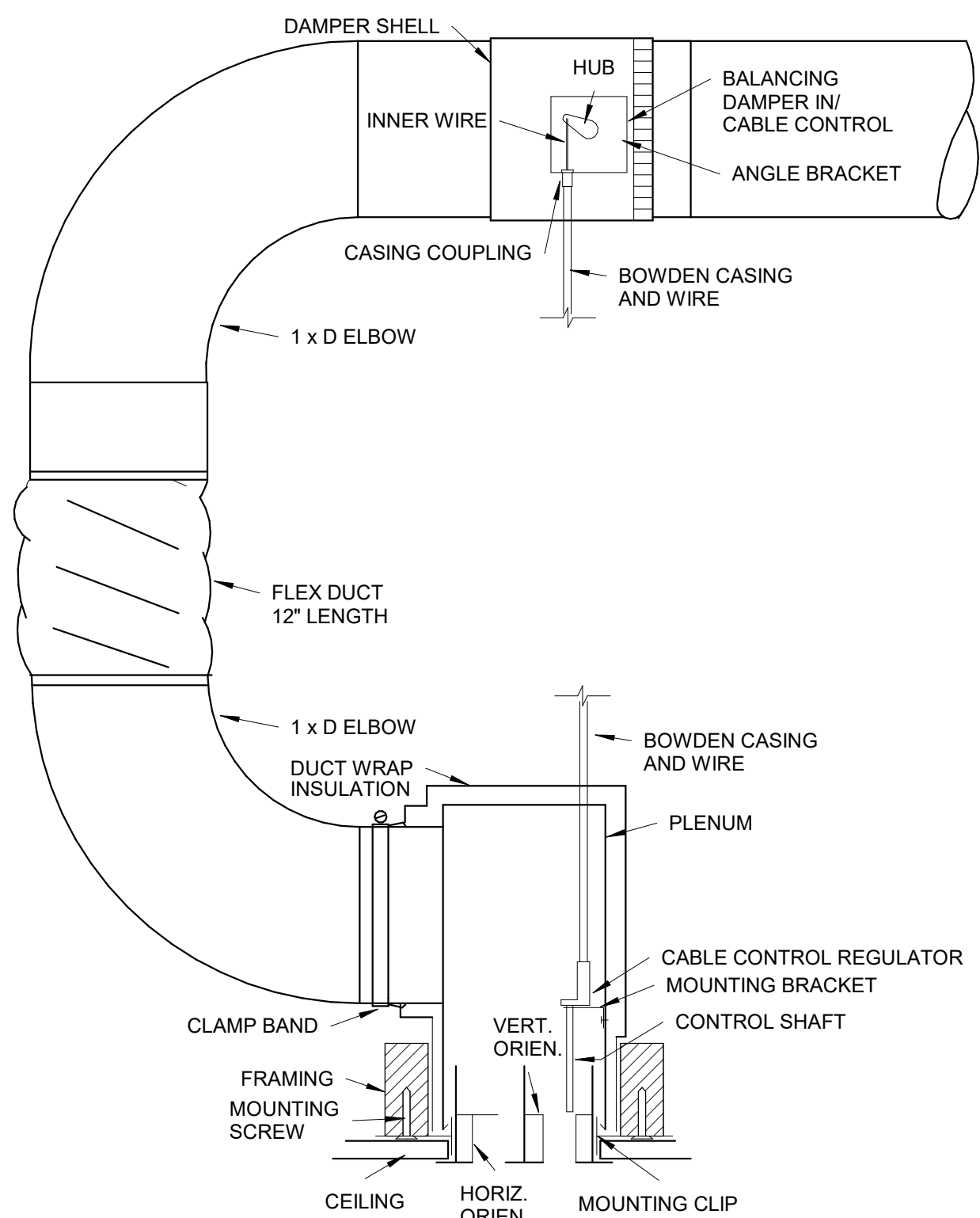
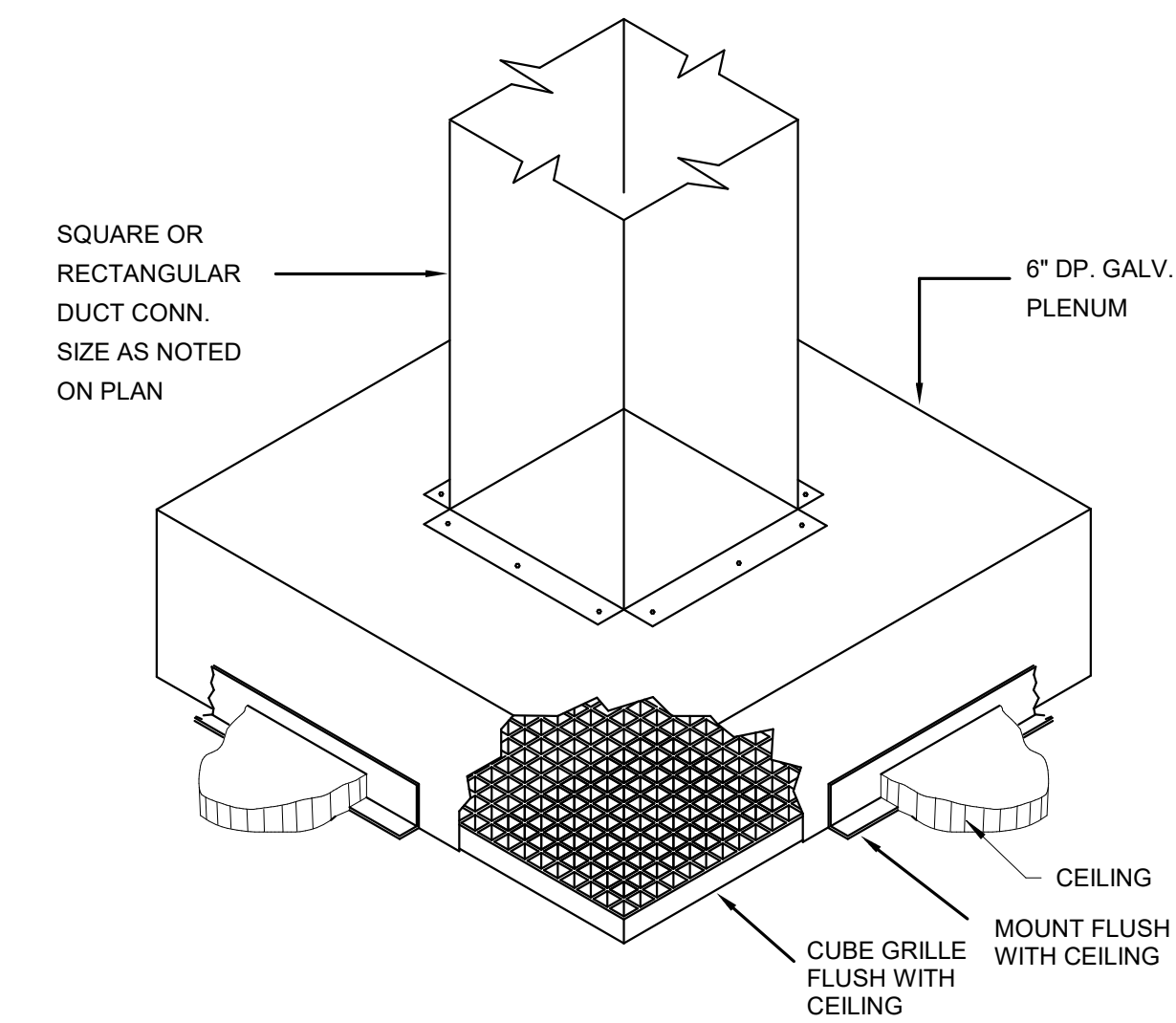
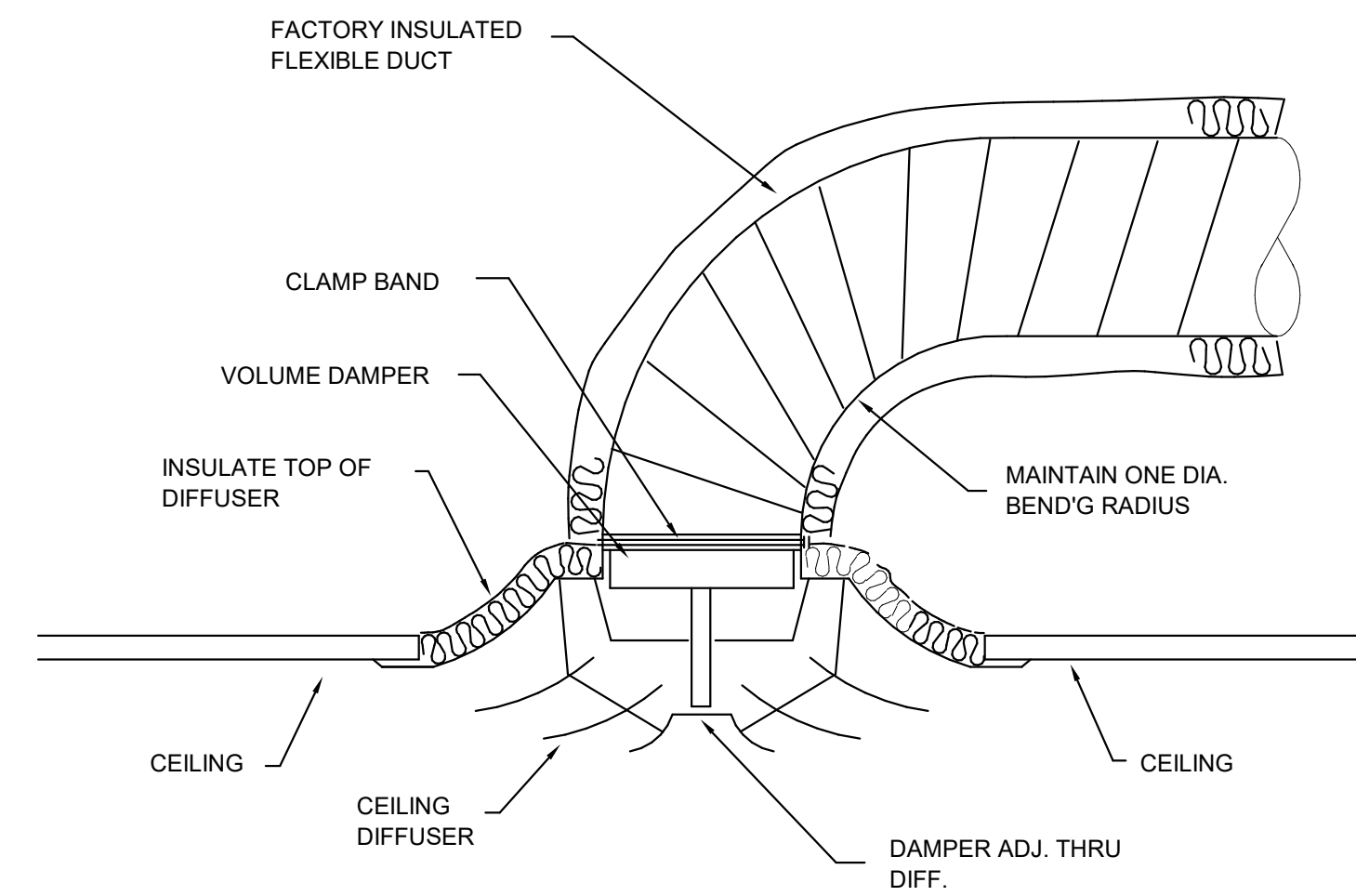
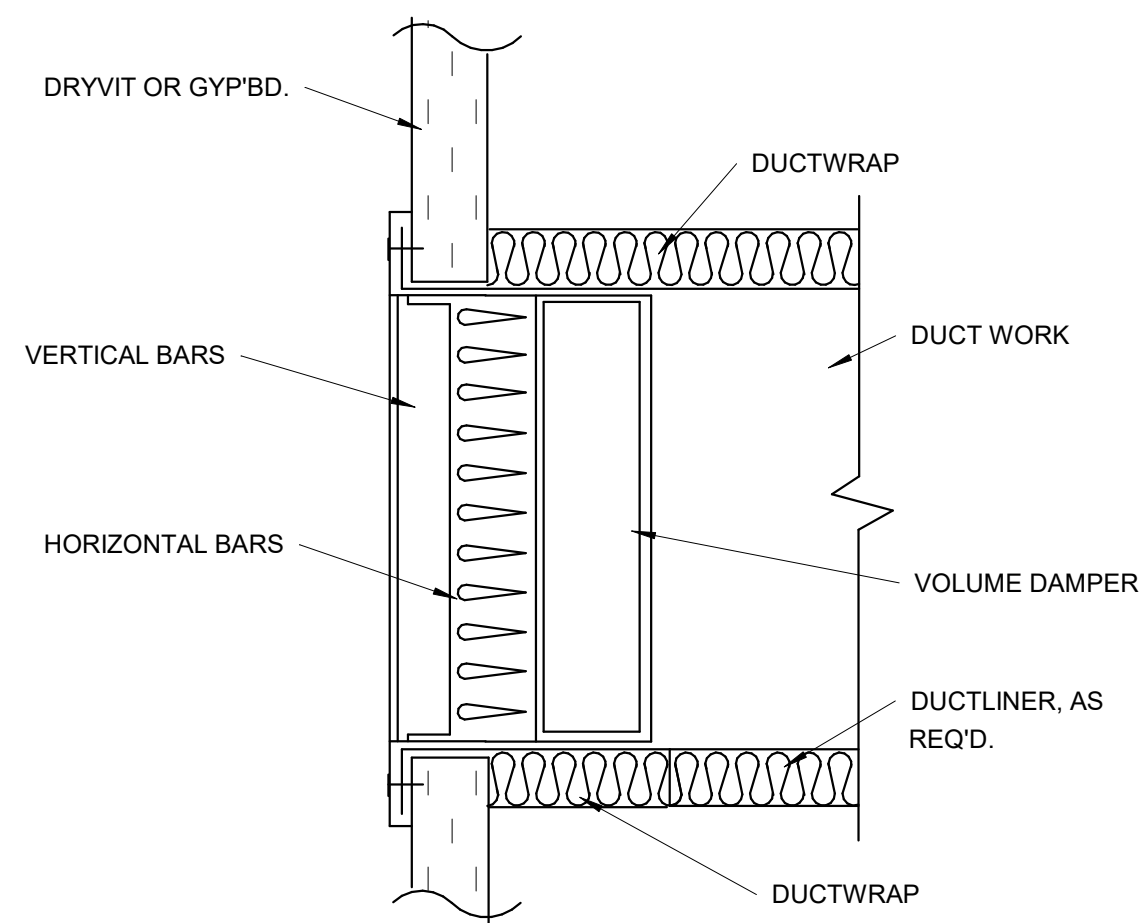
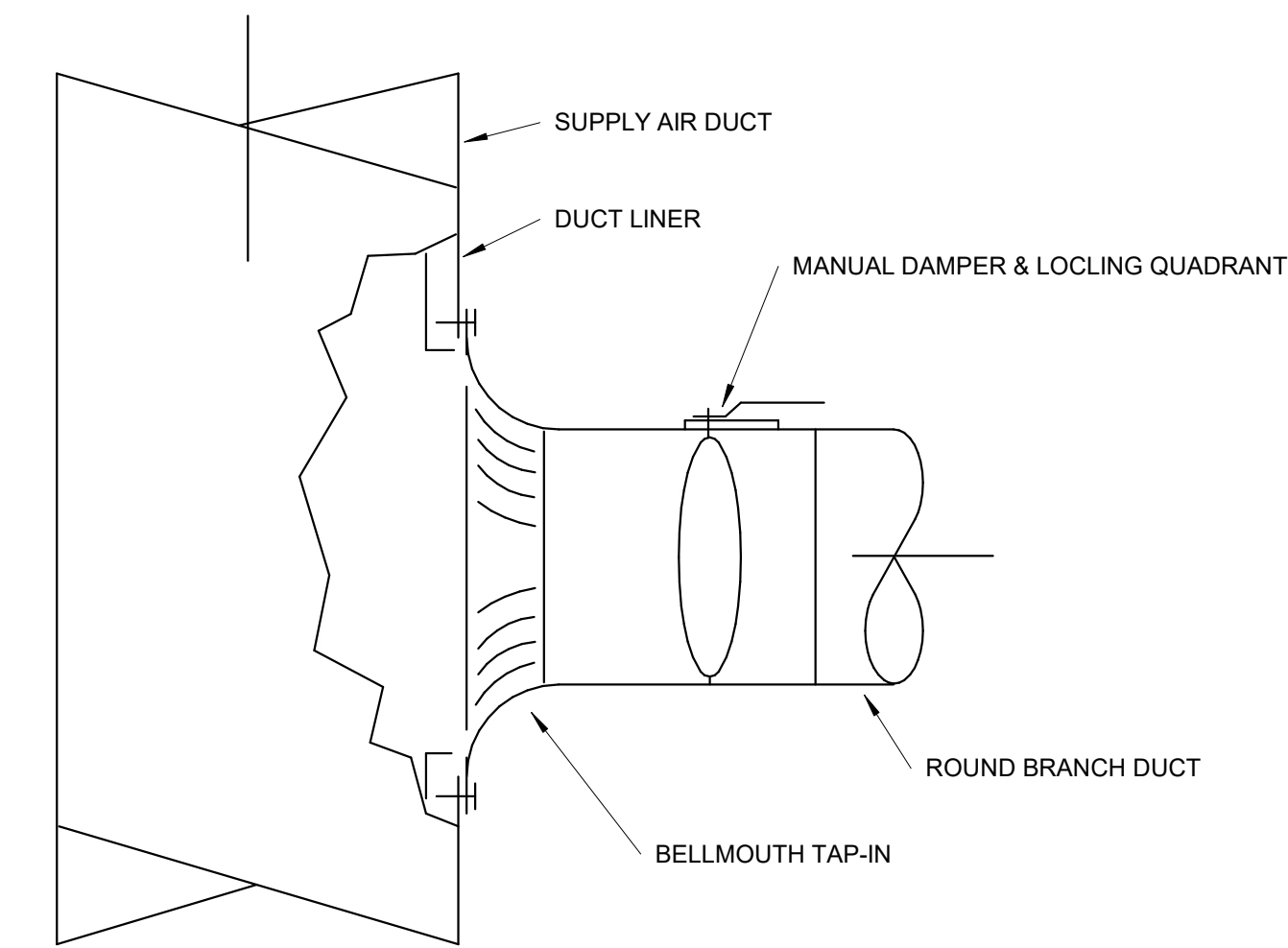
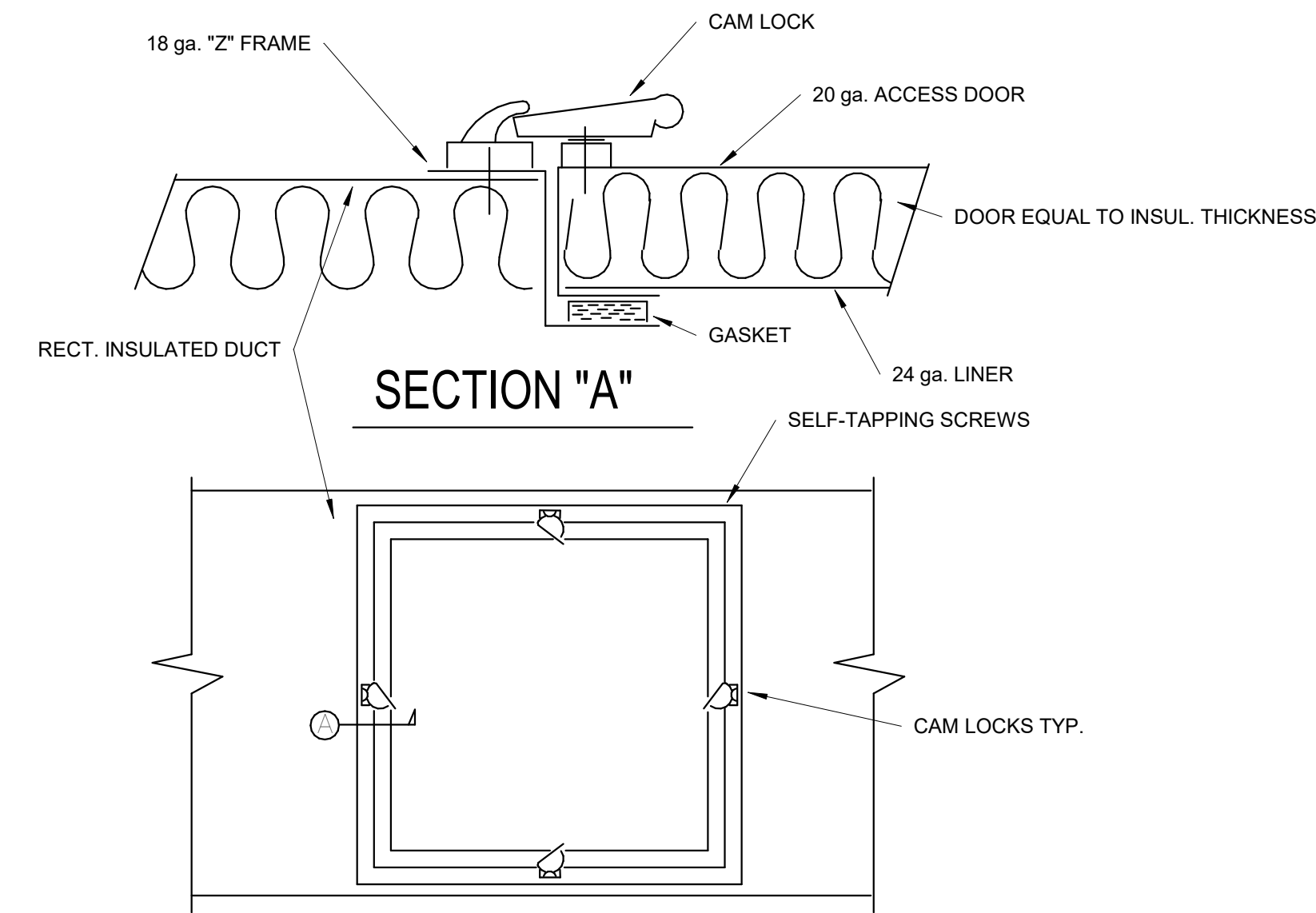
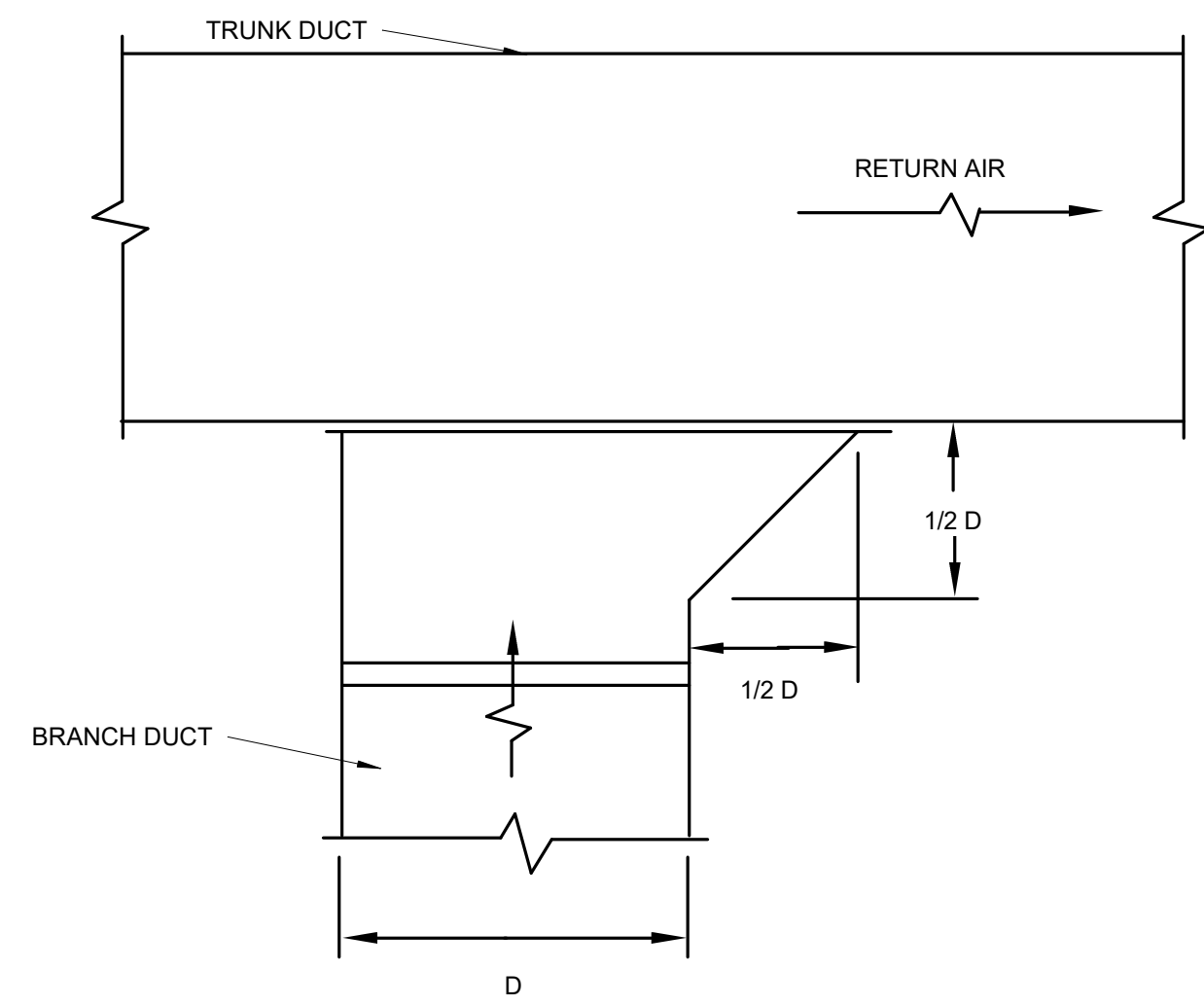
No:	SET:	DATE:
01	CD SET	7-23-21
03	RE-ISSUE, NO CHANGES	10-13-21

Drawing:

ELEVATIONS

M-306

1 ELEVATION THRU PNC
 1/4" = 1'-0"



A New Construction Project:

MSCCM - Ellis Theater Renovation

Project Site Address:

311 Byrd Avenue
Philadelphia, MS
39350

DAAD Project Number:

17583

No:	SET:	DATE:
01	CD SET	7-23-21
03	RE-ISSUE, NO CHANGES	10-13-21

Drawing:

DETAILS

M-501

ROOFTOP UNIT SCHEDULE																											
MARK	SERVES	DESIGN BASIS	MOD. NO.	UNIT WEIGHT	CFM	OSA CFM	ESP	SUPPLY FAN QTY/HP	COND. FAN QTY/HP	COOLING					HOT GAS REHEAT			HEATING			UNIT		UNIT MAX		REMARKS		
										EDB	EWB	LDB	LWB	MBH	OSA DB/WB	LDB	LWB	MBH	EDB	LDB	MBH IN	MBH OUT	FUEL	FLA		MCA	OCP
RTU-1	NW THEATER	DAIKIN	DPS010A	2463	3,490	690	0.60	(1) 4.0	(2) 1.0	78.2	66.7	55.5	54.9	121.8	95 / 78	70.0	58.7	54.6	58.9	101.4	200	160	N. GAS	41.7	46.1	60	1,2,3,4,5,6,7,8,9,10,11
RTU-2	NE THEATER	DAIKIN	DPS007A	2210	2,530	570	0.85	(1) 2.3	(2) 1.0	78.7	67.1	55.2	54.0	92.6	95 / 78	70.0	60.4	39.8	57.4	115.9	200	160	N. GAS	30.9	33.9	45	1,2,3,4,5,6,7,8,9,10,11
RTU-3	STAGE	DAIKIN	DPS010A	2465	3,700	450	1.00	(1) 4.0	(2) 1.0	77.4	64.2	54.1	54.0	117.9	95 / 78	68.0	60.8	55.5	63.2	103.2	200	160	N. GAS	41.7	46.1	60	1,2,3,4,5,6,7,8,9,10,11
RTU-4	SW THEATER	DAIKIN	DPS010A	2463	3,490	695	0.60	(1) 4.0	(2) 1.0	78.2	66.7	55.5	55.0	121.8	95 / 78	70.2	60.8	55.5	58.8	101.3	200	160	N. GAS	41.7	46.1	60	1,2,3,4,5,6,7,8,9,10,11
RTU-5	SE THEATER	DAIKIN	DPS007A	2210	2,755	565	0.85	(1) 2.3	(2) 1.0	78.3	67.1	56.1	54.9	93.9	95 / 78	74.7	60.8	55.5	58.5	112.3	200	160	N. GAS	30.9	33.9	45	1,2,3,4,5,6,7,8,9,10,11
RTU-6	ELLIS LOBBY	DAIKIN	DPS005A	1465	860	355	1.25	(1) 4.0	(1) 1/2	82.7	88.5	46.1	50.1	54.5	95 / 78	73.2	57.4	25.2	46.9	115.8	80	64	N. GAS	24.8	27.8	35	1,2,3,4,5,6,7,8,9,10,11
RTU-7	MAIN LOBBY	DAIKIN	DPS010A	2465	3,520	665	0.50	(1) 4.0	(2) 1	78.0	66.2	53.0	52.4	121.6	95 / 78	67.8	59.1	56.4	59.4	101.5	200	160	N. GAS	41.7	46.1	60	1,2,3,4,5,6,7,8,9,10,11

- DOWNFLOW GAS FIRED ROOFTOP UNIT WITH 100% OUTSIDE AIR ECONOMIZER, BAROMETRIC RELIEF DIRTY FILTER SWITCH, AND 14" HIGH PITCHED, INSULATED, GALVANIZED ISOLATION ROOF CURB
- SOUND AND VIBRATION ISOLATION ROOF CURB TO BE EQUAL TO MODEL ESSR BY KINETICS.
- INVERTER DRIVEN SCROLL COMPRESSOR(S) ON BASE CIRCUIT.
- DEHUMIDIFICATION CONTROL WITH MODULATING HOT GAS REHEAT.
- SINGLE ZONE VAV OPERATION
- UNIT VOLTAGE 208V / 3 PH / 60HZ. CONTROL TRANSFORMER, PHASE LOSS PROTECTION FACTORY MOUNTED DISCONNECT AND 115V GFI CONV. RECEPTACLE (UNIT POWERED)
- PROVIDE BACNET MSTP THERMOSTAT WITH IES CLOUD BASED CONTROLS OR EQUAL.
- PROVIDE SPACE CARBON DIOXIDE SENSOR FOR DEMAND CONTROL VENTILATION.
- ACCESS DOORS, ONE SET 2" PLEATED CONSTRUCTION SET OF FILTERS, TURNOVER SET OF 2" MERV 8 PLEATED FILTERS - CONTRACTOR TO PROVIDE UNIT WITH FACTORY MOUNTED R. A. AND S.A. DUCT MOUNTED SMOKE DETECTOR.
- PROVIDE ION GENERATOR WITH MINIMUM GENERATION RATE OF 1500 IONS PER CUBIC CENTIMETER DELIVERED TO SPACE
- MANUFACTURER AND MODEL NUMBERS IN SCHEDULE AND NOTES ARE FOR REFERENCE ONLY AND REPRESENTATIVE OF THE TYPE, QUALITY, AND PERFORMANCE TO BE PROVIDED.
- PRODUCT SUBSTITUTED FOR THOSE REFERENCED MUST BE AN APPROVED EQUAL

1.280

INTAKE HOOD SCHEDULE							
MARK	DESIGN BASIS	MOD. NO.	THROAT AREA	CFM	VELOCITY	STATIC PD. IN.	REMARKS
IH-1	GREENHECK	GRSI-10	0.57	305	535	0.048	1,2,3,4

- SLOPED INSULATED ROOF CURB
- GALVANIZED BIRD SCREEN
- 24 VOLT, MOTORIZED DAMPER INTERLOCKED WITH ACU-1 TO OPEN WHEN UNIT IS IN OCCUPIED MODE.
- MANUFACTURER AND MODEL NUMBER ARE FOR REFERENCE ONLY AND REPRESENTATIVE OF THE TYPE, QUALITY, AND PERFORMANCE TO BE PROVIDED. PRODUCT SUBSTITUTED FOR THOSE REFERENCED MUST BE AN APPROVED EQUAL

SPLIT SYSTEM AIR HANDLER SCHEDULE																					
MARK	SERVES	DESIGN BASIS	MOD. NO.	CFM	OSA CFM	EXT. S.P.	FAN HP	TOTAL MBH	SENSIBLE MBH	EDB	EWB	LDB	LWB	HP MBH	HEATER KW	HEATING EDB	HEATING LDB	UNIT VOLT / PH	UNIT MCA	UNIT MOCP	REMARKS

- SPLIT SYSTEM AIR HANDLER, FACTORY ASSEMBLED AND INSULATED
- CONVERTIBLE FOR HORIZONTAL OR VERTICAL AIR FLOW
- VERTICAL AIRFLOW CONFIGURATION
- MULTISPEED, DIRECT DRIVE CENTRIFUGAL BLOWER
- FACTORY INSTALLED REFRIGERANT COIL AND CONDENSATE DRAIN PAN
- FACTORY INSTALLED FLOW CONTROL CHECK VALVE ASSEMBLY WITH BRAZED CONNECTIONS
- FACTORY INSTALLED ELECTRIC HEATER WITH SINGLE POINT POWER CONNECTION. CONFIGURE FOR AUXILIARY HEAT
- FILTER RACK TO ACCOMMODATE 1" THK., 30% PLEATED FILTER MEDIA
- PROVIDE BACNET MSTP THERMOSTAT WITH IS CLOUD BASED CONTROLS OR EQUAL.
- PROVIDE ION GENERATOR WITH MINIMUM OF 1500 IONS PER CUBIC CENTIMETER DELIVERED TO SPACE
- MANUFACTURER AND MODEL NUMBER ARE FOR REFERENCE ONLY AND REPRESENTATIVE OF THE TYPE, QUALITY, AND PERFORMANCE TO BE PROVIDED.
- PRODUCT SUBSTITUTED FOR THOSE REFERENCED MUST BE AN APPROVED EQUAL

DUCTLESS SPLIT SYSTEM SCHEDULE																			
MARK	SERVES	MFG	MOD. NO.	CFM	COOLING				HEATING				VOLTS/PH/FLA	MCA	MOCP	REMARKS			
					MBH	MBH S	EDB	EWB	LDB	LWB	MBH	EDB					LDB		
DS-1	ELECTRICAL ROOM	DAIKIN	FTX30hVJU	890	31.4	21.0	80.0	67.0	53.2	51.6	--	--	--	208/110.37	17	20	1,3,4,5,6,7		
DSCU-1		DAIKIN	RK30NVMJUA		31.4									208/116.87			9,10,11		

- DUCTLESS SPLIT SYSTEM WALL MOUNTED INDOOR UNIT
- INDOOR UNIT POWERED FROM OUTDOOR UNIT
- MULTISPEED INDOOR FAN
- RATINGS CERTIFIED IN ACCORDANCE WITH A.R.I. STANDARD 210/240
- FACTORY CHARGED WITH REFRIGERANT R-410A
- WIRELESS REMOTE CONTROLLER
- IN-LINE CONDENSATE PUMP
- NOT USED
- REFRIGERANT LINE SIZE: RL=1/4" RS=5/8"
- SINGLE INDOOR INVERTER COOLING ONLY SYSTEM
- COMPRESSOR TO BE EQUIPPED WITH THE FOLLOWING FEATURES:

INTERNAL OVER TEMPERATURE PROTECTION
INTERNAL OVER PRESSURE PROTECTION
THERMOSTATICALLY CONTROLLED SUMP HEATER
CENTRIFUGAL OIL PUMP

FAN SCHEDULE													
MARK	MFG.	MOD. NO.	CFM	ESP	HP	RPM	EFF.	FRPM	SONES	MOUNTING	FAN TYPE	DRIVE	REMARKS
EF-1	GREENHECK	GB-120-3	980	0.94	1/3	1725	--	1395	11.6	ROOF	CENTRIF	BELT	1,2,4,5,6,7,8,9,10,11
EF-2	GREENHECK	G-095-D	100	0.52	1/8	1550	--	1550	9.5	ROOF	CENTRIF	DIRECT	1,3,4,5,6,7,9,10,11
EF-3	GREENHECK	G-070-D	75	0.42	1/30	1550	--	1550	4.4	ROOF	CENTRIF	DIRECT	1,3,4,5,6,7,9,10,11

- MANUFACTURER AND MODEL NUMBER ARE FOR REFERENCE ONLY AND REPRESENTATIVE OF THE TYPE, QUALITY, AND PERFORMANCE TO BE PROVIDED. PRODUCT SUBSTITUTED FOR THOSE REFERENCED MUST BE AN APPROVED EQUAL
- CENTRIFUGAL DOWN BLAST, BELT DRIVE, ROOF EXHAUSTER
- CENTRIFUGAL DOWN BLAST, DIRECT DRIVE, ROOF EXHAUSTER
- ALUMINUM HOUSING, BACKWARD INCLINED ALUMINUM WHEEL
- PITCHED INSULATED ROOF CURB WITH DAMPER TRAY
- NEMA 3R DISCONNECT, MOUNTED AND WIRED
- GRAVITY BACKDRAFT DAMPER
- EXTENDED LUBE LINES
- WIRE MESH BIRD SCREEN
- OPEN, DRIP PROOF MOTOR, MINIMUM EFFICIENCIES AS SPECIFIED
- MOTOR VOLTAGE, 120V-1PH

SOUND ATTENUATOR SCHEDULE																			
MARK	SERVES	DESIGN BASIS	MODEL	CFM	C/L LENGTH	WIDTH	HEIGHT	IN	OUT	MINIMUM DYNAMIC INSERTION LOSS								PD IN. WG	REMARKS
										63	125	250	500	1K	2K	4K	8K		
RA-3	RTU-3 RETURN	KINETICS	12KCES-F3	3335	96	46	16	42"	42"	5	11	30	54	55	56	43	29	0.16	1,2,3

- ELBOW RECTANGULAR SILENCER
- 16 GA CASING, 22 GA. PERFORATED LINING, 1" SLIP FIT CONNECTIONS
- FIBERGLASS ACOUSTIC MEDIA

HEAT PUMP SCHEDULE												
MARK	DESIGN BASIS	MOD. NO.	MBH	COMP HP	COND. FAN HP	UNIT VOLTS / PH / FLA	UNIT MCA	MAX OCP	LINE SIZE		REMARKS	
									RL	RS		
CU-1	LENNOX	ML14XP1-060	52.6	--	--	208 / 3 / --	18.0	30.0	3/8	7/8"	1,2,3,4,5,6,7	

- FACTORY PACKAGED COMPRESSOR / HEAT PUMP, U.L. LISTED FOR OUTDOOR USE.
- RATINGS CERTIFIED IN ACCORDANCE WITH A.R.I. STANDARD 210/240
- FACTORY CHARGED WITH REFRIGERANT 410A
- SCROLL COMPRESSOR TO BE EQUIPPED WITH THE FOLLOWING FEATURES:
INTERNAL OVER TEMPERATURE PROTECTION
INTERNAL OVER PRESSURE PROTECTION
THERMOSTATICALLY CONTROLLED SUMP HEATER
CENTRIFUGAL OIL PUMP
LIQUID LINE FILTER DRYER
- FIELD INSTALLED HEAD PRESSURE CONTROL FOR LOW AMBIENT OPERATION.
- PROPERLY SIZED REFRIGERANT ACCESSORIES TO INCLUDE:

THERMAL EXPANSION VALVE
LIQUID LINE SIGHT GLASS / MOISTURE INDICATOR
SUCTION LINE FILTER / DRYER

- MANUFACTURER AND MODEL NUMBER ARE FOR REFERENCE ONLY AND REPRESENTATIVE OF THE TYPE, QUALITY, AND PERFORMANCE TO BE PROVIDED. PRODUCT SUBSTITUTED FOR THOSE REFERENCED MUST BE AN APPROVED EQUAL

AIR DISTRIBUTION SCHEDULE									
MARK	DESIGN BASIS	TYPE	MOD. NO.	FACE	NECK	MOUNTING	CFM	REMARKS	
A	PRICE	S	JSP 2 SLOT	48"X11.5"	10"	SURFACE	270	1,2,3	
B	PRICE	S	JSP 2 SLOT	48"X11.5"	10"	SURFACE	300	1,2,3	
C	PRICE	S	JSP 2 SLOT	37"X11.5"	10"	SURFACE	300	1,2,3	
B1	PRICE	S	SDS50 SDB 3 SLOT	48"X4"	8"	SURFACE	170	4,5	
C1	PRICE	S	SDS50 SDB 1 SLOT	48"X4"	5"	SURFACE	70	4,5	
D	PRICE	R	SERIES 96	18X38	16X36	SURFACE	SEE PLAN	4,5,7	
D1	PRICE	R	SERIES 96	22X16	20X14	SIDEWALL	700	4,5,7	
D2	PRICE	R	SERIES 96	28X38	24X36	SIDEWALL	SEE PLAN	4,5,7	
E	PRICE	S	SCD	24x24	6	SURFACE	SEE PLAN	4,5,7,9	
F	PRICE	S	SCD	24x24	8	SURFACE	SEE PLAN	4,5,7,9	
G	PRICE	S	SCD	24x24	10	SURFACE	SEE PLAN	4,5,7,9	
H	PRICE	S	SCD	24x24	12	SURFACE	SEE PLAN	4,5,7,9	
J	PRICE	S	SCD	12X12	6	SURFACE	SEE PLAN	4,5,7,9	
K	PRICE	S	520 SERIES	12X12	10X10	SURFACE	SEE PLAN	4,5,7	
L	PRICE	R	SERIES 96	12X12	10X10	SURFACE	SEE PLAN	5,7	
M	PRICE	R	SERIES 80	24x24	22x22	SURFACE	SEE PLAN	4,5,11	
N	PRICE	E,T	SERIES 80	24x24	22x22	SURFACE	SEE PLAN	4,5,11	
O	PRICE	S	520 SERIES	8X10	8X6	SIDEWALL	SEE PLAN	4,5,7	
P	PRICE	R	SERIES 96	8X10	8X6	SIDEWALL	SEE PLAN	5,7	
R	PRICE	R	SERIES 96	26X8	24X6	SIDEWALL	SEE PLAN	5,7	
S	PRICE	R	SERIES 80	12X12	6X6	SURFACE	SEE PLAN	4,5,11	
T	PRICE	S	SDG	14X4	14X4	SIDEWALL	SEE PLAN	4,6,7,12	
U	PRICE	T	SERIES 96	18X16	14X16	SIDEWALL	SEE PLAN	2,3,5	
V	PRICE	R	SERIES 96	18X12	14X16	SIDEWALL	SEE PLAN	2,3,5	
W	PRICE	S	AND	10"	10"	DUCT	247	5,7,9	
X	PRICE	R	SERIES 96	62X16	60X14	SIDEWALL	1190	2,3,5	
Y	PRICE	R	SERIES 96	48X14	44X16	SIDEWALL	955	2,3,5	
Z	--	R	--	--	--	SEE PLAN	14		

- PRICE JS JET SLOT DIFFUSER WITH PLENUM. 48" WITH TWO 2-1/2" SLOTS. DIRECT ONE SLOT TOWARD CENTER OF THEATER, ONE SLOT DOWN WALL
- PRICE JS JET SLOT DIFFUSER WITH PLENUM. LENGTH AS NOTED. TWO 2-1/2" SLOTS. SLOTS TO WASH CEILING
- PROVIDE CABLE CONTROLLED DAMPER UPSTREAM OF GRILLE WITH CONTROLLER MOUNTED IN PLENUM
- VOLUME DAMPER
- WHITE FINISH
- ALUMINUM FINISH
- LOUVERED FACE
- PERFORATED FACE
- 4-WAY THROW UNLESS OTHERWISE NOTED
- FILTER RETURN
- 1/2 x 1/2 CUBE FACE WITH 6" DEEP LINED PLENUM. DUCT SIZE PER PLAN

- AIR SCOOP
- OPEN END RETURN DUCT, COVER WITH EXPANDED METAL - 80% FREE AREA.

S = SUPPLY, R = RETURN, E = EXHAUST



Dryden

2520 White Avenue
Nashville, TN 37204

615.248.3223
dryden.studio



A New Construction Project:

MSCCM - Ellis Theater Renovation

Project Site Address:

311 Byrd Avenue
Philadelphia, MS
39350

DAAD Project Number:

17583

No:	SET:	DATE:
01	CD SET	7-23-21
02	REVISED ROOTOP EQUIPMENT, DUCT	10-13-21

Drawing:

MECHANICAL SCHEDULES

M-601

SPACE HEATING UNIT SCHEDULE												
MARK	MFG.	MOD. NO.	CFM	ESP	MBH	FUEL	FAN HP.	RPM	VOLTS/PHHZ	MCA	MOP	REMARKS
SHU-1	GREENHECK	DGX-P116-H22-MF	3,500	0.5	197	N.G.	2	1725	208/3/60	10.1	15.0	1,2,3,4,5,6,7,8,9,10,11,12

1. OUTDOOR DOWNFLOW, DIRECT FIRED, 80/20 RECIRCULATING SPACE HEATING UNIT.
WITH PITCHED INSULATED ROOF CURB. PROVIDE LAGGING IN CURB PER ROOFTOP UNIT DETAIL.
2. LOUVERED WEATHERHOOD WITH ALUMINUM MESH FILTERS.
3. 2" MERV 8 SUPPLY AIR FILTERS, 4-WAY DISCHARGE PLENUM
4. 2 POSITION MOTORIZED INLET DAMPER WITH END SWITCH, LOW LEAKAGE RETURN AIR DAMPER
5. FACTORY MUTUAL COMPLIANT GAS TRAIN WITH FLAME SENSING.
6. STAND ALONE MICROPROCESSOR UNIT CONTROLS WITH REMOTE PANEL- PROVIDE BACNET MSTP INTERFACE,
DISCHARGE AIR TEMPERATURE CONTROL WITH ROOM OVERRIDE,
OUTDOOR AIR TEMPERATURE SENSING, AND SUPPLY AIR LOW LIMIT PROTECTION
7. CONSTANT VOLUME, MIXED FLOW, PLENUM, SUPPLY FAN WITH VARIABLE SPEED DRIVE.
8. FACTORY MOUNTED NEMA 3R DISCONNECT SWITCH
9. GAS PRESSURE REGULATOR, 2 PSIG TO 14 IN. WC.
10. MOTOR SHALL BE OPEN DRIP-PROOF, MINIMUM EFFICIENCIES PER EPACT
11. ACCESS DOORS, ONE SET 2" PLEATED CONSTRUCTION SET OF FILTERS, TURNOVER SET OF 2" MERV 8 PLEATED FILTERS -
CONTRACTOR TO PROVIDE UNIT WITH FACTORY MOUNTED R. A. AND S.A. DUCT MOUNTED SMOKE DETECTOR.
12. MANUFACTURER AND MODEL NUMBERS IN SCHEDULE AND NOTES ARE FOR REFERENCE ONLY AND REPRESENTATIVE OF THE TYPE, QUALITY, AND PERFORMANCE TO BE PROVIDED.
PRODUCT SUBSTITUTED FOR THOSE REFERENCED MUST BE AN APPROVED EQUAL

ELECTRIC UNIT HEATER											
MARK	MFG	MOD. NO.	HEATER			FAN					REMARKS
			KW	VOLTS	AMPS	PHASE	CFM	TEMP. RISE	HP		
EUH-1	MARKEL	E3312T2RPW	1.5	120	12.5	3	175	27	--		1,2,3

1. FORCED AIR WALL HEATER WITH POWDER COATED STEEL FRONT
2. INTEGRAL THERMOSTAT, AUTOMATIC RESET THERMAL LIMIT
3. 600 RPM VANE AXIAL FAN



A New Construction Project:

MSCCM - Ellis Theater Renovation

Project Site Address:

311 Byrd Avenue
Philadelphia, MS
39350

DAAD Project Number:

17583

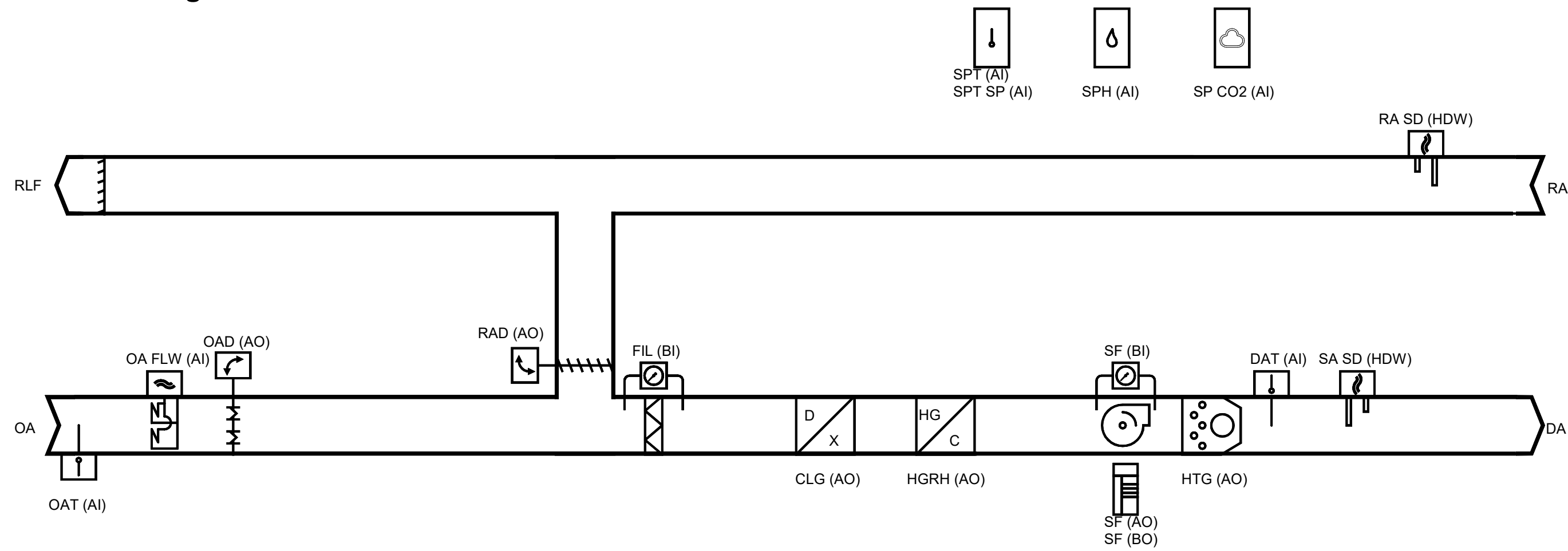
No: 02 SET: REVISED ROOFTOP EQUIPMENT, DUCT DATE: 10-13-21

Drawing:

MECHANICAL
SCHEDULES

M-602

Flow Diagram: PACKAGED RTU



Sequence of Operations: PACKAGED RTU Occupied:
 During occupied periods, the supply fan shall run continuously, and the mixed air dampers shall open to maintain minimum ventilation requirements. The DX cooling and the gas heat shall control to maintain the active discharge air temperature setpoint. If economizing is enabled, the outdoor air or mixed air dampers shall modulate to maintain the discharge air temperature setpoint and the relief air damper shall track the mixed air dampers. The discharge air temperature setpoint shall be dynamically reset based on the deviation of actual space temperature from the active space temperature setpoint. If the discharge air temperature sensor fails, the DX cooling and the gas heat shall be disabled, and an alarm shall be sent to the operator via the unit's cloud base interface.

Unoccupied:
 When the space temperature is below the unoccupied heating setpoint of 60.0 deg. F (adj.) the supply fan shall be commanded on, the outside air damper shall remain closed and the gas heat shall be enabled. When the space temperature rises above the unoccupied heating setpoint of 60.0 deg. F (adj.) plus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop, and the gas heat shall be disabled. When the space temperature is above the unoccupied cooling setpoint of 85.0 deg. F (adj.) the supply fan shall be commanded on, the outside air damper shall open if economizing is enabled and remain closed if economizing is disabled and the DX cooling shall be enabled. When the space temperature falls below the unoccupied cooling setpoint of 85.0 deg. F (adj.) minus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop, the DX cooling shall be disabled, and the outside air damper shall close.

Optimal Start:
 The Unit Controller shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Morning Warm-Up Mode:
 During optimal start, if the space temperature is below the occupied heating setpoint a morning warm-up mode shall be activated. When morning warm-up is initiated the unit shall enable the heating and fan(s). The outside air damper shall remain closed. When the space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

Pre-Cool Mode:
 During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling. The outside air damper shall remain closed. When pre-cool is initiated the unit shall enable the fan and cooling. The outside air damper shall remain closed. When the space temperature reaches the occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Heating Mode:
 The BACnet MSTP Thermostat shall use the space temperature and space temperature setpoint to determine when to initiate requests for heat. When the space temperature drops below the setpoint, the unit controller shall enable DX heating to maintain the space temperature setpoint. Once the space temperature rises above the setpoint, the unit controller shall stage the DX heating as required to maintain the space temperature setpoint. When the space temperature falls below the setpoint the controller shall disable DX heating.

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 The BACnet MSTP Thermostat shall use the space temperature and space temperature setpoint to determine when to initiate requests for heat. When the space temperature drops below the setpoint, the unit controller shall enable DX heating to maintain the space temperature setpoint. Once the space temperature rises above the setpoint, the unit controller shall stage the DX heating as required to maintain the space temperature setpoint. When the space temperature falls below the setpoint the controller shall disable DX heating.

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Heat/Cool Mode:
 When the space temperature rises above the occupied cooling setpoint the mode shall transition to cooling. When the space temperature falls below the occupied heating setpoint the mode shall transition to heating. When the space temperature is above the occupied cooling setpoint or below the occupied heating setpoint the mode shall remain in its last state. If the space temperature sensor fails, the mode shall remain in its last state and an alarm shall be sent to the operator via the unit's cloud base interface.

Dehumidification:
 The unit shall be in dehumidification mode if the space humidity is above the dehumidification setpoint. In the dehumidification mode, the supply air fan shall be enabled, the outside air damper shall be commanded to minimum position, and the unit controller shall energize mechanical cooling and the reheat solenoid. Factory installed hot gas reheat shall allow application of dehumidification. Dehumidification shall be allowed only when the outside air temperature is above 40.0 deg. F and the space temperature is above 60.0 deg. F. The economizer outside air damper shall drive to minimum position during dehumidification. In conjunction with dehumidification, MHGRH shall be used to raise the temperature of the cooled air to a desirable value. MHGRH is comprised of a parallel coil arrangement, with dual reheat valves (which operate in concert with one another) and a check valve. During Dehumidification control with modulating Hot Gas Reheat (MHGRH) an analog signal (0-10Vdc) is controlled as described below.

A PI Loop is used to control the HGRH valves to maintain the Discharge Air Temperature from the reheat coil.

Compressor staging during reheat (or dehumidification) will be controlled by the Leaving DX Coil Temperature. For increased dehumidification during reheat, the standard default compressor staging range is 45 - 52°F (Adj).

When dehumidification is active in the Cooling state, the reheat set point equals the DAT Cooling Setpoint. For DAT units, this is the normal DAT set point resulting from any reset. For Zone Control units, this set point is the result of a PI Loop based on the Control Temperature.

Communication with the reheat control valves is accomplished by providing a 0-10Vdc signal to a pair of interface boards which in turn supply the control signal to the reheat valves (step type).

In the Fan Only state, no sensible cooling is required, but dehumidification mode will still be enabled if the dew point or humidity sensor is not satisfied. Reheat set point varies from a maximum value (default 65°F Adj) when the Control Temperature is at or below the heating changeover setpoint to a minimum value (default 55°F Adj) when the Control Temperature is at or above the cooling changeover setpoint.

Economizer:
 ENABLE (Reference Dry Bulb): Outside air (OA) temperature shall be compared with a reference dry bulb setpoint. The economizer shall be disabled when the OA temperature is less than reference dry bulb setpoint + 2.0 deg. F. OPERATION: The supply air sensor shall measure the dry bulb temperature of the air leaving the evaporator coil while economizing. When economizing is enabled and the unit is operating in the cooling mode, the economizer damper shall modulate between its minimum position and 100% to maintain the space temperature setpoint. Minimum position shall be calculated based on supply fan speed. If the supply air temperature starts to fall below supply air temperature setpoint, the outdoor damper shall be at minimum position. Compressors shall be delayed from operating until the economizer has opened to 100% for 5 minutes.

Ventilation Control:
 When the space CO2 level is greater than or equal to the Design Minimum CO2 Setpoint, the outdoor air damper shall open to the Design Minimum Outdoor Air Damper Setpoint. When the space CO2 level is less than or equal to the DCV Minimum CO2 Setpoint, the outdoor air damper shall close to the DCV Minimum Outdoor Air Damper Setpoint. If there is a call for economizer cool the damper shall be opened further to satisfy the cool request.

Supply Fan:
 The unit controller shall vary the supply fan speed to optimize minimum fan speed in all cooling and heating modes.

Single Zone Variable Air Volume with Space fan and Discharge Air Control
 Cooling Mode: The unit's cooling mode of operation is controlled by the control temperature, the change-over temperature, and the discharge air temperature. The unit goes into the cooling mode of operation by analyzing the control temperature. The control temperature for a VAV system is the return (or the space, field selectable) temp temperature. The unit goes into the cooling mode of operation when the control temperature (space or return temperature) is above the change-over setpoint by more than 1/2 the deadband. When this takes place, the cooling mode of operation will begin and the 1st stage of compressor (VSD compressor) operation will start. The unit controller will turn ON the next stage of compressor operation, or turn off a stage of compressor operation, to maintain the discharge air temperature setpoint within the deadband and control the supply fan speed based on the space demand (from 33 to 100% Adj). When a compressor stage turns ON, the next compressor stage up or down will not take place for the next 4 minutes. This "4 minutes" is called the stage timer. When a cooling stage is initiated no further operation will take place within the stage timer limit. Reference the Cooling Setup menu for the adjustable stage time value. In the above Heating Mode: The unit's Heat mode of operation is controlled by the control temperature, the change-over temperature, and the discharge air temperature. The unit goes into the heating mode of operation by analyzing the control temperature. The control temperature for a SZVAV system is the return (or the space, field selectable) temp temperature. The unit goes into the heating mode of operation when the control temperature (space or return temperature) is above the change-over setpoint by more than 1/2 the deadband. When this takes place, the cooling mode of operation will begin and the 1st stage of heat (Modulating gas heat) operation will start. The unit controller will turn ON the next stage (if two stages are available only first stage will be modulating) of heat operation if equipped, or turn off a stage of heat operation, to maintain the discharge air temperature setpoint within the deadband and control the supply fan speed based on the space demand (from 33 to 100% Adj). When a heating stage is initiated no further operation will take place within the stage timer limit.

Relief Air and Building Pressure Control:
 The barometric relief dampers shall open with increased building pressure. As the building pressure increases, the pressure in the unit return section also increases, opening the dampers and relieving air.

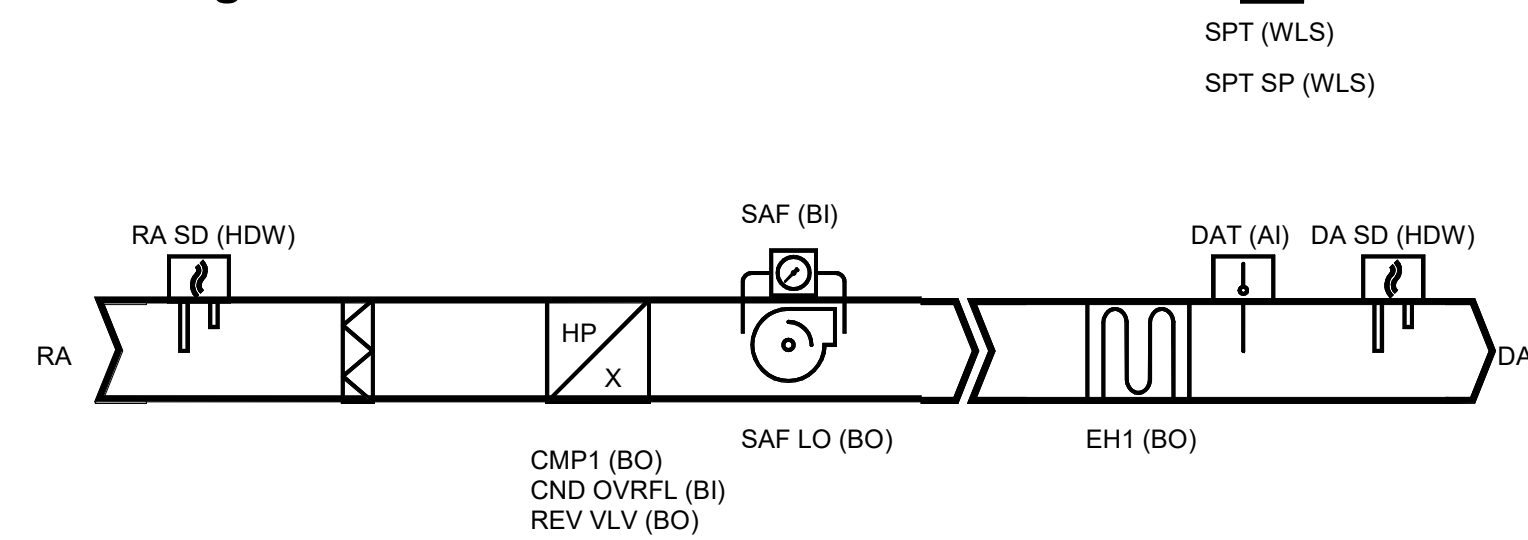
Filter Status:
 A differential pressure switch shall monitor the differential pressure across the filter(s) when the fan is running. If the switch closes during normal operation a dirty filter alarm shall be sent to the operator via the unit's cloud base interface.

Smoke Detector Shutdown:
 The unit shall shut down in response to a signal from the smoke detector indicating the presence of smoke. The smoke detector shall be interlocked to the unit through the dry contacts of the smoke detector. A manual reset of the smoke detector shall be required to restart the unit.

JESCO, Inc.
 Construction
MECHANICAL - ELECTRICAL
 2000 McCullough Boulevard
 Tupelo, MS 38801
 662-842-3167 662-841-2338

Dryden
 2520 White Avenue
 Nashville, TN 37204
 615.248.3223
 dryden.studio

Flow Diagram: HEAT PUMP



Sequence of Operations: Heat Pump Occupied:
 During occupied periods, the supply fan shall run continuously, and the outside air damper shall open to maintain minimum ventilation requirements. The DX heating and cooling shall control to maintain the active space temperature setpoint.

Unoccupied:
 When the space temperature is below the unoccupied heating setpoint of 60.0 deg. F (adj.) the supply fan shall start, and the DX heating shall be enabled. When the space temperature rises above the unoccupied heating setpoint of 60.0 deg. F (adj.) plus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop, and the DX heating shall be disabled. When the space temperature is above the unoccupied cooling setpoint of 85.0 deg. F (adj.) the supply fan shall start, the outside air damper shall remain closed, and the DX cooling shall be enabled. When the space temperature falls below the unoccupied cooling setpoint of 85.0 deg. F (adj.) minus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop, the DX cooling shall be disabled, and the outside air damper shall remain closed.

Optimal Start:
 The BACnet MSTP Thermostat shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Morning Warm-Up Mode:
 During optimal start, if the space temperature is below the occupied heating setpoint a morning warm-up mode shall be activated. When morning warm-up is initiated the unit shall enable the heating and supply fan. The outside air damper shall remain closed. When the space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

Pre-Cool Mode:
 During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling. The outside air damper shall remain closed. When pre-cool is initiated the unit shall enable the fan and cooling. The outside air damper shall remain closed. When the space temperature reaches the occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Heating Mode:
 The BACnet MSTP Thermostat shall use the space temperature and space temperature setpoint to determine when to initiate requests for heat. When the space temperature drops below the setpoint, the unit controller shall enable DX heating to maintain the space temperature setpoint. Once the space temperature rises above the setpoint, the unit controller shall stage the DX heating as required to maintain the space temperature setpoint. When the space temperature falls below the setpoint the controller shall disable DX heating.

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Optimal Stop:
 The BACnet MSTP Thermostat shall monitor the scheduled unoccupied time, occupied setpoints and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint. Outside air damper shall remain enabled to provide minimum ventilation.

Occupied Bypass:
 The BACnet MSTP Thermostat shall monitor the status of the ON and CANCEL buttons of a space sensor, the unit shall transition from its current occupancy mode to occupied bypass mode and the unit shall maintain the space temperature to the occupied setpoints (adj.).

Cooling Mode:
 The BACnet MSTP Thermostat shall use space temperature and space temperature setpoint to determine when to stage the cooling. When the space temperature rises above the setpoint, the unit controller shall stage the DX cooling as required to maintain the space temperature setpoint. When the space temperature falls below the setpoint the controller shall disable DX cooling.

Heating Mode:
 The BACnet MSTP Thermostat shall use the space temperature and space temperature setpoint to determine when to initiate requests for heat. When the space temperature drops below the setpoint, the unit controller shall enable DX heating to maintain the space temperature setpoint. Once the space temperature rises above the setpoint, the unit controller shall stage the DX heating as required to maintain the space temperature setpoint. When the space temperature falls below the setpoint the controller shall disable DX heating.

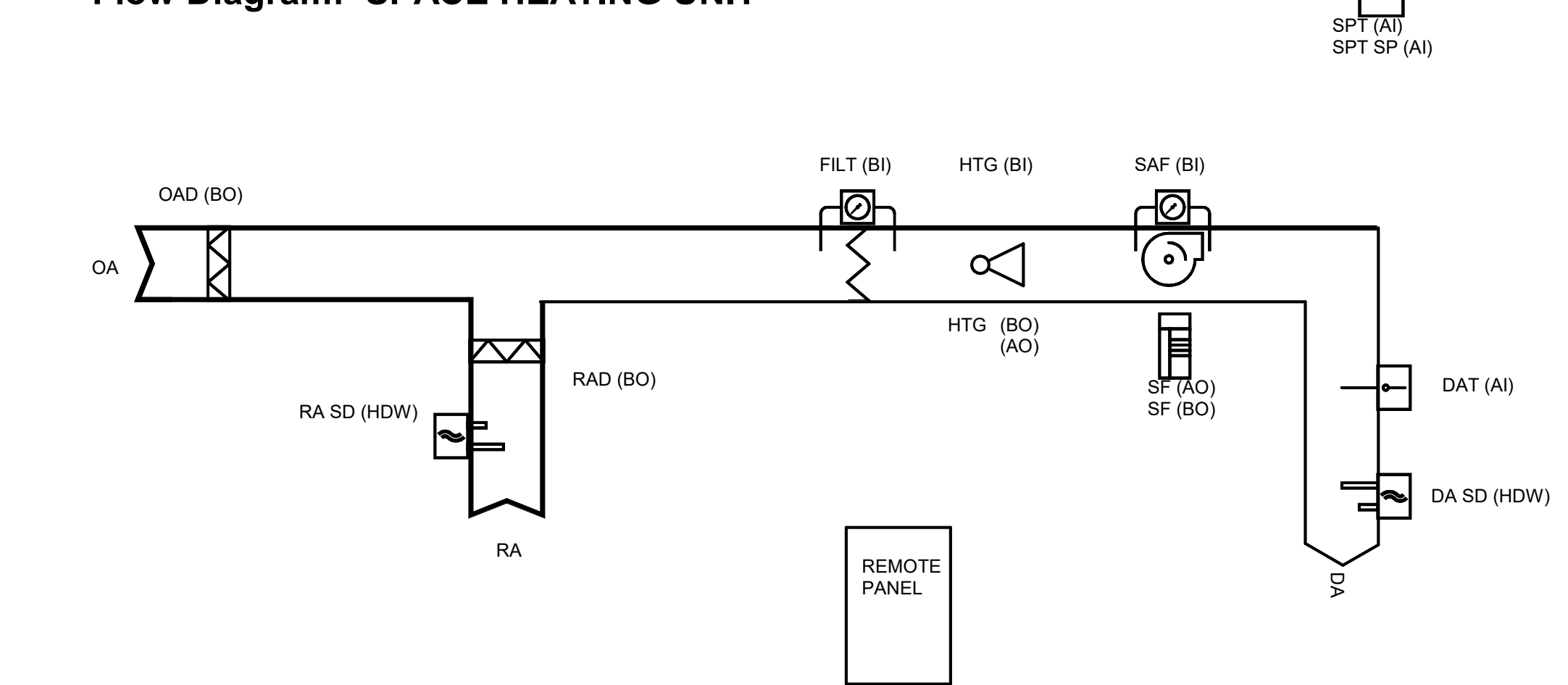
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 The BACnet MSTP Thermostat shall use the space temperature and space temperature setpoint to determine when to initiate requests for heat. When the space temperature drops below the setpoint, the unit controller shall enable DX heating to maintain the space temperature setpoint. Once the space temperature rises above the setpoint, the unit controller shall stage the DX heating as required to maintain the space temperature setpoint. When the space temperature falls below the setpoint the controller shall disable DX heating.

2 HEAT PUMP SCHEMATIC
 3/16" = 1'-0"

Flow Diagram: SPACE HEATING UNIT



Sequence of Operations: SPACE HEATING UNIT
 The Space heating unit will remain enabled during all occupied and unoccupied periods. The Space heating unit's microprocessor controller will monitor outside air temperature, space temperature above the theater ceiling, and unit discharge air temperature.

Any time the outdoor air temperature is below 50°F and the space temperature above the theater ceiling falls below 45°F (adj) the space heating unit will be enabled. The unit's inlet damper shall open, the unit return damper shall open to its pre-set 80% return position. The unit's supply fan shall start and run continuously, and the unit's natural gas burner section will be enabled and light.

The unit's microprocessor controller shall modulate the natural gas heating section to maintain the above ceiling space temperature above 45°F (adj).

When the outdoor air temperature has risen above 55°F and remained above 55°F for more than two hours the Space Heating Unit's burner will be disabled, the unit's fan will be stopped, and outside air and return air dampers will close.

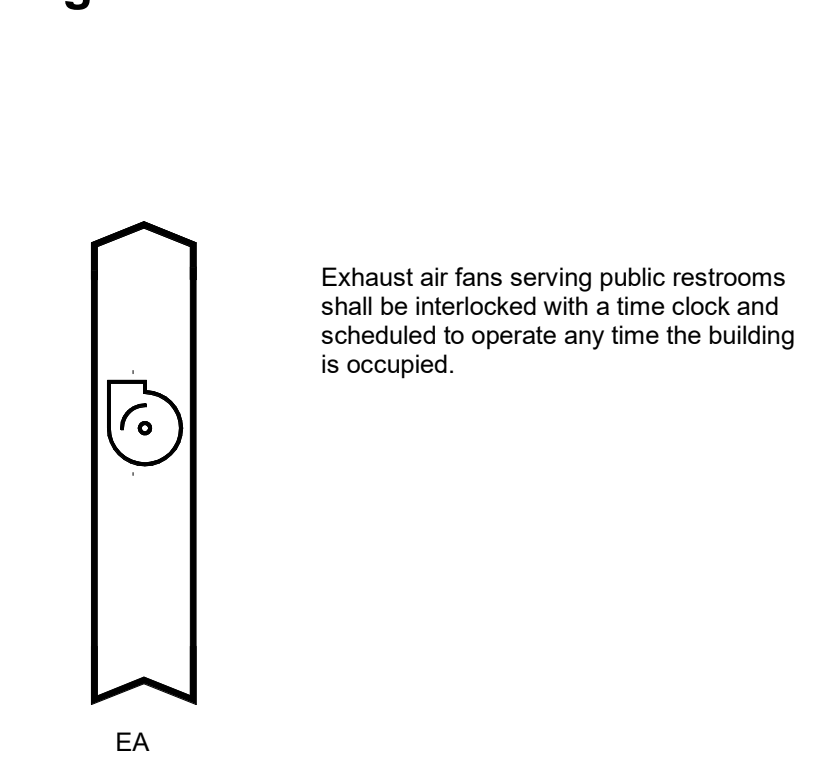
If the Space Heating Unit controller detects a failure of the heater to ignite the unit's fan will be stopped, and outside air and return air dampers will close. An alarm indication will be displayed on the unit's remote panel.

Filter Status:
 A differential pressure switch shall monitor the differential pressure across the unit's supply air filters when the fan is running. If the switch closes during normal operation a dirty filter alarm shall be displayed on the units remote control panel.

Smoke Detector Shutdown:
 The unit shall shut down in response to a signal from the smoke detector indicating the presence of smoke. The smoke detector shall be interlocked to the unit through the dry contacts of the smoke detector. A manual reset of the smoke detector shall be required to restart the unit.

4 SPACE HEATING UNIT SCHEMATIC
 3/16" = 1'-0"

Flow Diagram: EXHAUST FAN



3 EXHAUST FAN SCHEMATIC
 3/16" = 1'-0"

A New Construction Project:

MSCCM - Ellis Theater Renovation



Project Site Address:
 311 Byrd Avenue
 Philadelphia, MS
 39350

DAAD Project Number:
 17583

No:	SET:	DATE:
01	CD SET	7-23-21
02	REVISED ROOTOP EQUIPMENT, DUCT	10-13-21

Drawing:
 HVAC SEQUENCES OF OPERATION
M-701

LEGEND

SS	SANITARY SEWER		GATE VALVE
SD	STORM DRAIN		GLOBE VALVE
---	DOMESTIC WATER		GAS COCK
---	HOT WATER		BALL VALVE
---	HOT WATER RETURN		CHECK VALVE
PS	PROCESS SEWER		STRAINER
PE	PROCESS EFFLUENT		BALANCING VALVE
PW	PROCESS WATER		CIRCUIT SENSOR
	PIPE TURN DOWN		FLANGED GATE VALVE
	PIPE TURN UP		FLANGED GLOBE VALVE
	TEE TURNING DOWN		FLANGED CHECK VALVE
	TEE TURNING UP		FLANGED STRAINER
	BREAK IN PIPING		FLANGED GAS COCK
	CONNECTION TO EXISTING PIPING		FLANGED BALL VALVE
	INDICATES PIPING TO RECEIVE INSULATION. SEE SPECIFICATIONS FOR TYPE AND THICKNESS		FLANGED BALANCING VALVE
			BUTTERFLY VALVE
			THERMOMETER AND WELL
			PRESSURE GAUGE
			CONCENTRIC REDUCER
			ECCENTRIC REDUCER

STANDARD ABBREVIATIONS

A/G - ABOVE GROUND	FBO - FURNISHED BY OTHERS	P - PUMP
ABV - ABOVE	FCO - FLOOR CLEAN OUT	PLBG - PLUMBING
ACC - AIR COOLED CHILLER	FCU - FAN COIL UNIT	PRDV - PRESSURE REDUCING VALVE
ACU - AIR CONDITIONING UNIT	FD - FLOOR DRAIN (PLUMBING)	PRLV - PRESSURE RELIEF VALVE
AD - ACCESS DOOR	FD - FIRE DAMPER (MECHANICAL)	PTAC - PACKAGED TERMINAL AIR CONDITIONER
AE - AIR EXTRACTOR	FGCO - FLUSH GRADE CLEAN OUT	PTU - PACKAGED TERMINAL UNIT
AFF - ABOVE FINISHED FLOOR	FLG - FLANGE, FLANGED	PVC - POLYVINYLCHLORIDE
AHU - AIR HANDLING UNIT	FPHB - FROST PROOF HOSE BIBB	PW - POTABLE WATER
ARU - AIR ROTATION UNIT	FTU - FAN POWERED VAV TERMINAL UNIT	
AAV - AIR ADMITTANCE VALVE	FWE - FURNISHED WITH EQUIPMENT	
		RD - ROOF DRAIN
BVFL - BUTTERFLY VALVE, LUGGED TYPE	GC - GENERAL CONTRACTOR	RL - REFRIGERANT LIQUID LINE
BFV - BUTTERFLY VALVE, WAFER TYPE	GDF - GAS DUCT FURNACE	RS - REFRIGERANT SUCTION LINE
BFP - BACKFLOW PREVENTER	GDH - GAS DUCT HEATER	RTU - ROOF TOP AIR CONDITIONER
BOP - BOTTOM OF PIPE	GF - GAS FURNACE	
	GWH - GAS WATER HEATER	S - SINK
CB - CATCH BASIN	GRH - GRAVITY RELIEF HOOD	SA - SHOCK ABSORBER
CH - CHILLER		SD - SPLITTER DAMPER
CHW - CHILLED WATER		SF - SUPPLY FAN
CHWP - CHILLED WATER PUMP	H - HUMIDIFIER	SHU - SPACE HEATING UNIT
CI - CAST IRON	HB - HOSE BIBB	SMKD - SMOKE DAMPER
CT - COOLING TOWER	HW - HEATING WATER	SS - SERVICE SINK
CTW - COOLING TOWER WATER	HWUH - HOT WATER UNIT HEATER	SSTL - STAINLESS STEEL
CU - COPPER	HX - HEAT EXCHANGER	STL - STEEL
CV - CONTROL VALVE		STM - STEAM
CW - CONDENSER WATER	IH - INTAKE HOOD	TOP - TOP OF PIPE
CWP - CONDENSER WATER PUMP	IL - INTAKE LOUVER	TOS - TOP OF STEEL
	IRH - INFRARED HEATER	TWU - THROUGH WALL UNIT
D - DAMPER		U - URINAL
DIP - DUCTILE IRON PIPE	L - LAVATORY (PLUMBING)	U/G - UNDERGROUND
DVV - DRAIN WASTE VENT	L - LOUVER (MECHANICAL)	UON - UNLESS OTHERWISE NOTED
DCW - DOMESTIC (POTABLE) COLD WATER	LPG - LIQUEFIED PETROLEUM GAS	UH - UNIT HEATER
DHW - DOMESTIC (POTABLE) HOT WATER		
	MC - MECHANICAL CONTRACTOR	VAL - VALVE
EC - ELECTRICAL CONTRACTOR	MH - MAN HOLE	VAV - VARIABLE AIR VOLUME TERMINAL UNIT
EDF - ELECTRIC DRINKING FOUNTAIN	MD - MOTORIZED DAMPER	VD - VOLUME DAMPER
EDH - ELECTRIC DUCT HEATER		VT - VENT
EF - EXHAUST FAN	NEC - NATIONAL ELECTRICAL CODE	VTR - VENT THROUGH ROOF
EH - EXHAUST HOOD	NG - NATURAL GAS	
EL - EXHAUST LOUVER	NIC - NOT IN CONTRACT	
EUH - ELECTRIC UNIT HEATER	NRS - NON RISING STEM	
EWI - ELECTRIC WATER HEATER		WC - WATER CLOSET
EWSH - EMERGENCY EYE WASH / SHOWER	OVS - OIL WATER SEPARATOR	WCO - WALL CLEAN OUT
	OSY - OUTSIDE SCREW AND YOKE	WF - WASH FOUNTAIN
		WH - WATER HEATER

PLUMBING DRAWING INDEX				
SHEET #	SHEET TITLE	Current Revision	Current Revision Date	Current Revision Description
P.001	PLUMBING LEGEND AND SCHEDULE	02	10/13/21	REV. AS SHOWN
P.101	PLUMBING FIRST FLOOR SANITARY	02	10/13/21	REV. AS SHOWN
P.102	PLUMBING FIRST FLOOR DOMESTIC WATER	02	10/13/21	REV. AS SHOWN
P.201	PLUMBING SECOND FLOOR SANITARY	02	10/13/20	REISSUE - NO CHANGE
P.401	ENLARGED PLUMBING PLANS SANITARY	02	10/13/21	REV. AS SHOWN
P.402	ENLARGED PLUMBING PLANS DOMESTIC WATER	02	10/13/21	REV. AS SHOWN
P.403	PLUMBING ISOMETRIC DRAWINGS	02	10/13/21	REV. AS SHOWN
P.404	PLUMBING ISOMETRIC DRAWINGS	02	10/13/21	REV. AS SHOWN
P.501	PLUMBING DETAILS	02	10/13/21	REV. AS SHOWN
P.502	PLUMBING DETAILS	02	10/13/20	REISSUE - NO CHANGE

PLUMBING FIXTURE SCHEDULE										
SYMBOL	MANUFACTURER	MOD. NO.	MOUNTING	WST.	VNT.	CW.	HW.	REMARKS		
WC-1	KOHLER	K-96053-B	FLOOR	4"	2"	1"	-	WATER CLOSET, WHITE VITREOUS CHINA W/ 6147SM161.002 SENSOR OPERATED FV OPEN FRONT SEAT #K-4670-C		
WC-2	KOHLER	K-96057-B	FLOOR	4"	2"	1"	-	WATER CLOSET, WHITE VITREOUS CHINA W/ 6147SM161.002 SENSOR OPERATED FV AND KOHLER K-4670-C WHITE SEAT RIM 18" AFF FOR HANDICAP USE		
U-1	KOHLER	K-5452-ET	WALL	2"	2"	3/4"	-	URINAL, WHITE VITREOUS CHINA W/ 6145SM101.002 SENSOR OPERATED FV AND ZURN 1221 CARRIER		
U-1H	KOHLER	K-5452-ET	WALL	2"	2"	3/4"	-	URINAL, WHITE VITREOUS CHINA W/ 6145SM101.002 SENSOR OPERATED FV MOUNT FLUSH VAL. HANDLE IN FRONT AND ZURN 1221 CARRIER RIM MTD. AT 17" A.F.F. FOR HANDICAP USE		
L-1	KOHLER	K-2241-4-0	COUNTER TOP	1 1/4"	2"	1/2"	1/2"	LAVATORY, WHITE VITREOUS CHINA 2508.105 LEAD LAW COMPLIANT BATTERY POWER SENSOR FCT, McGUIRE #2165 SUPPLIES, #155-WC OFFSET STRAINER, #8872 1 1/4" P-TRAP INSULATE WATER SUPPLY LINES AND DRAIN LINE PER ADA WITH "HAND-LAV" PLASTIC COVERS		
L-2	KOHLER	K-2032-0	WALL	1 1/4"	2"	1/2"	1/2"	LAVATORY, WHITE VITREOUS CHINA 2508.105 LEAD LAW COMPLIANT BATTERY POWER SENSOR FCT, McGUIRE #2165 SUPPLIES, #155-WC OFFSET STRAINER, #8872 1 1/4" P-TRAP INSULATE WATER SUPPLY LINES AND DRAIN LINE PER ADA WITH "HAND-LAV" PLASTIC COVERS RIM HEIGHT 34", ZURN 1231 CARRIER		
S-1	ELKAY	CHSB1716C	WALL	2"	2"	1/2"	1/2"	SINGLE COMPARTMENT SINK, STAINLESS STEEL SINK W/ LKB400 FAUCET, LKB8 DRAIN McGUIRE #2165 SUPPLIES, #151 STRAINER #8912 1 1/2" P-TRAP.		
SS-1	WILLIAMS	MTB 2424	FLOOR	3"	2"	3/4"	3/4"	SERVICE SINK, 24"x24"x10" MOLDED STONE W/ K-8908 FAUCET		
FD-1	J.R. SMITH	2010-A-94	FLOOR	-	-	-	-	FLOOR DRAIN W/ 5" ROUND NICKEL BRONZE STRAINER SPEEDI-SET OUTLET W/ PROSET TRAP GUARD SIZE AS SHOWN ON PLAN		
FS-1	ZURN	Z1910-2	FLOOR	3"	-	-	-	FLOOR SINK 8"x8"x6" DEEP CAST IRON BODY AND SQUARE, MEDIUM DUTY (3/4) GRATE WITH SLOTTED OPENINGS, WHITE ACID RESISTING PORCELAIN ENAMEL INTERIOR AND TOP, WITH ABS ANTI-SPLASH INTERIOR BOTTOM DOME STRAINER.		
FCO	J.R. SMITH	4151	FLOOR	-	-	-	-	FLOOR CLEANOUT FOR USE IN TILE FLOORS SPEEDI-SET OUTLET SIZE AS SHOWN ON PLAN		
FGCO	J.R. SMITH	4231	GRADE	-	-	-	-	FLUSH GRADE CLEANOUT W/ 18"x18"x4" CONCRETE PAD HEAVY DUTY CAST IRON TOP SPEEDI-SET OUTLET SIZE AS SHOWN ON PLAN		
WCO	J.R. SMITH	4472	WALL	-	-	-	-	WALL CLEANOUT PLUG & COVER FOR USE IN SANITARY TAP TEE SIZE AS SHOWN ON PLAN		
BFP	WATTS	909M1-QT-S		-	-	2"	-	REDUCES PRESSURE ZONE BACKFLOW ASSEMBLY WITH D STRAINER		

WATER HEATER SCHEDULE											
MARK	MFG.	MOD. NO.	GALLONS CAPACITY	ELEMENT WATTAGE	BTUH INPUT	GPH	THERMOSTAT SETPOINT (F)	FUEL TYPE	FLUE SIZE	VOLT / PH / AMPS	REMARKS
WH-1	EEMAX	SPEX75	--	5,600		38°F @ 1 GPM	--	ELEC.		208V /1PH /27A	1,2,3,4,5,9
WH-2	EEMAX	SPEX75	--	5,600		38°F @ 1 GPM	--	ELEC.		208V /1PH /27A	1,2,3,4,5,9
WH-4	BRADFORD WHITE	E120U6	19	1,500		7 GPH @ 90°F	120	ELEC.		120V /1PH /12.5A	6,7,8,9,10
WH-5	BRADFORD WHITE	E120U6	19	1,500		7 GPH @ 90°F	120	ELEC.		120V /1PH /12.5A	6,7,8,9,10

- ELECTRIC NON-THERMOSTATIC TANKLESS WATER HEATER
- REPLACEABLE CARTRIDGE ELEMENT
- INTEGRATED FLOW METER FOR ACCURATE TURN ON/OFF FLOW RATE
- 3/8" COMPRESSION FITTINGS
- LISTED BY UNDERWRITERS LABORATORIES, U.L. LABEL
- TANK TYPE STORAGE WATER HEATER
- SURFACE MOUNTED, AUTOMATIC THERMOSTAT
- FACTORY INSTALLED TEMPERATURE AND PRESSURE RELIEF VALVE
- MAXIMUM HYDROSTATIC WORKING PRESSURE 150 PSI
- ANODE ROD(S) AND DRAIN VALVE



Dryden

2520 White Avenue
Nashville, TN 37204
615.248.3223
dryden.studio



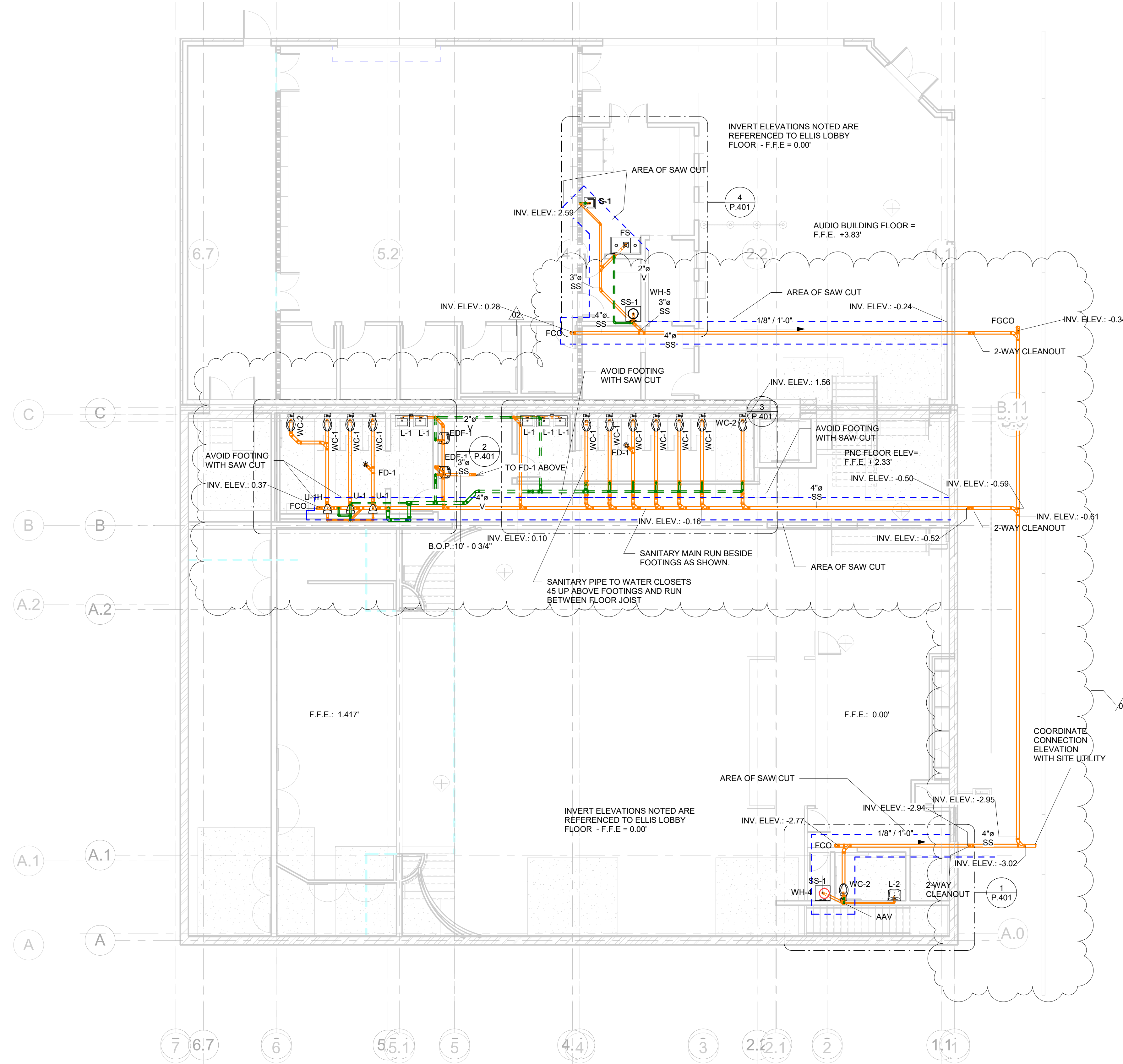
A New Construction Project: MSCCM - Ellis Theater Renovation

Project Site Address:
311 Byrd Ave.
Philadelphia, MS
39350

DAAD Project Number:
17583

No: 01 02 SET: CD Set DATE: 08/11/21 10/13/21

Drawing:
PLUMBING LEGEND AND SCHEDULE
P.001



GENERAL NOTES

1. COORDINATE ROUTING OF PIPING AND EQUIPMENT WITH ALL TRADES PRIOR TO BEGINNING CONSTRUCTION.
2. COORDINATE REQUIREMENTS FOR ALL WALL AND FLOOR PENETRATIONS WITH STRUCTURAL ENGINEER.
3. PLUMBING CONTRACTOR RESPONSIBLE FOR ALL SANITARY WASTE, DOMESTIC WATER PIPING INSIDE BUILDING TO FIVE FEET OUTSIDE BUILDING FOOTPRINT. CONTINUATION OF UTILITIES PAST FIVE FEET OUTSIDE BUILDING BY SITE UTILITY CONTRACTOR.
4. REVIEW ARCHITECTURAL LIFE SAFETY PLANS FOR LOCATIONS OF RATED ASSEMBLIES. PROVIDE FIRE CAULK, AS REQUIRED, FOR ALL RATED PENETRATIONS.

NOTES

1. SEE SHEET P.001 FOR FIXTURE SCHEDULE, WATER HEATER SCHEDULE AND PLUMBING LEGEND AND ABBREVIATIONS.
2. SEE SHEET P.102 FOR FIRST FLOOR DOMESTIC WATER.
3. SEE SHEET P.201 FOR SECOND FLOOR PLUMBING.
4. SEE SHEET P.401 AND P.402 FOR ENLARGED PLUMBING PLANS
5. SEE SHEET P.403 AND P.404 FOR PLUMBING ISOMETRIC DRAWINGS.
6. SEE SHEET P.501 AND P.502 FOR PLUMBING DETAILS.



A New Construction Project:

**MSCCM -
Ellis Theater
Renovation**

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01	CD Set	08/11/21
02	REV. AS SHOWN	10/13/21

1 FLOOR PLAN - SANITARY
1/8" = 1'-0"

Drawing:

**PLUMBING FIRST FLOOR
SANITARY**

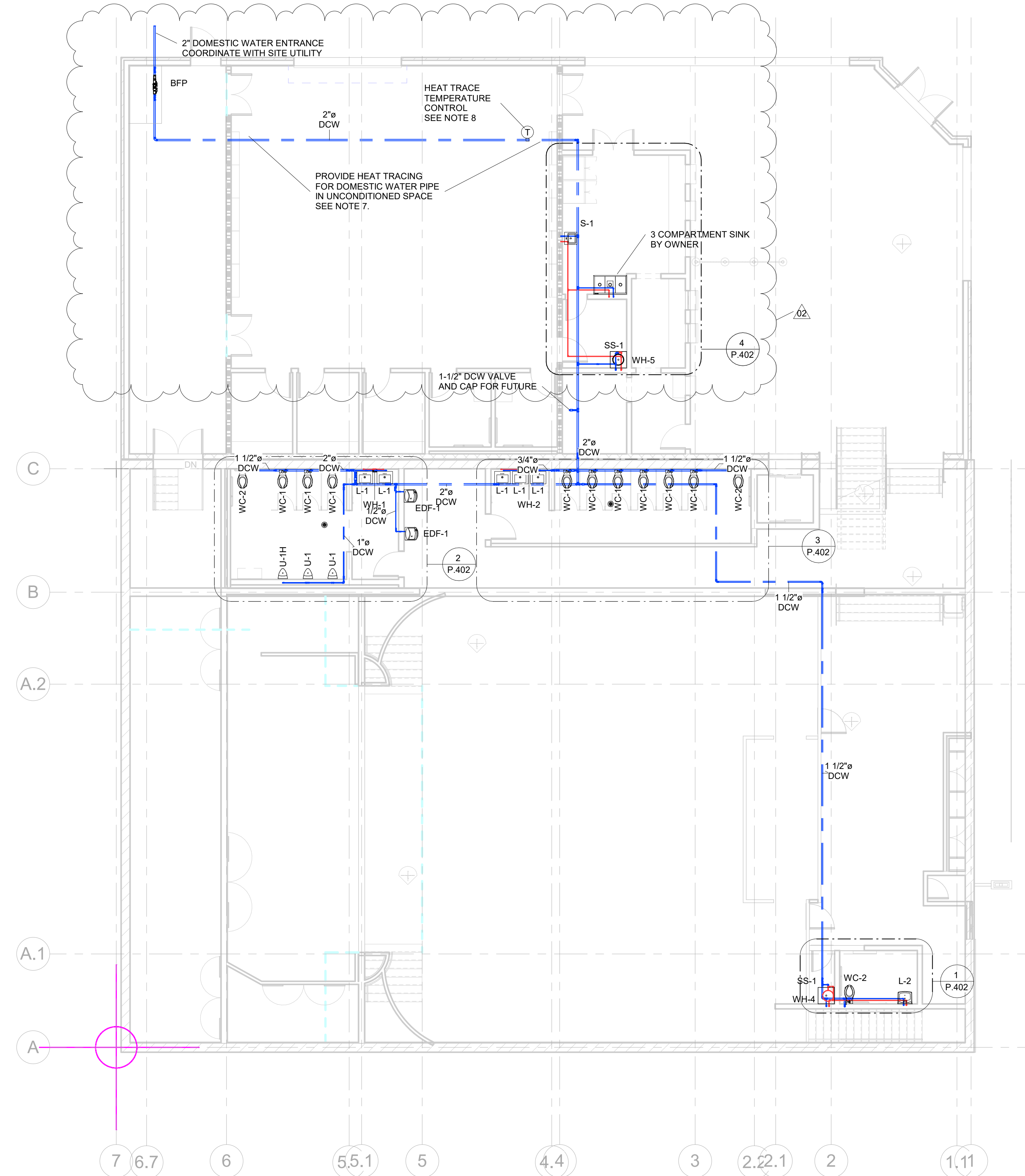
P.101

GENERAL NOTES

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 2. SEE SHEET P.101 FOR FIRST FLOOR SANITARY.
 3. SEE SHEET P.201 FOR SECOND FLOOR PLUMBING.
 4. SEE SHEET P.401 AND P.402 FOR ENLARGED PLUMBING PLANS
 5. SEE SHEET P.403 AND P.404 FOR PLUMBING ISOMETRIC DRAWINGS.
 6. SEE SHEET P.501 AND P.502 FOR PLUMBING DETAILS.
 7. PROVIDE HEAT TRACING FOR DOMESTIC WATER LINE IN UNCONDITIONED SPACE. CHROMALOX CPR CABLE, 3W PER FOOT SELF REGULATING CABLE OR EQUAL.
 8. CHROMALOX DL MODEL NUMBER RTBC OR EQUAL SINGLE POINT TEMPERATURE CONTROLLER FOR HEAT TRACING.
- COORDINATE ELECTRICAL SERVICE WITH ELECTRICAL CONTRACTOR. E.C. TO PROVIDE ELECTRICAL CIRCUIT WITH GROUND FAULT CIRCUIT INTERRUPTOR. MINIMUM TRIP LEVEL OF 30 mA.



(1) FLOOR PLAN - DOMESTIC WATER
1/8" = 1'-0"

A New Construction Project:
**MSCCM -
Ellis Theater
Renovation**

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311 Byrd Ave.
Philadelphia, MS
39350

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17583

No:	SET:	DATE:
01	CD Set	08/11/21
02	REV. AS SHOWN	10/13/21

Drawing:

**PLUMBING FIRST FLOOR
DOMESTIC WATER**

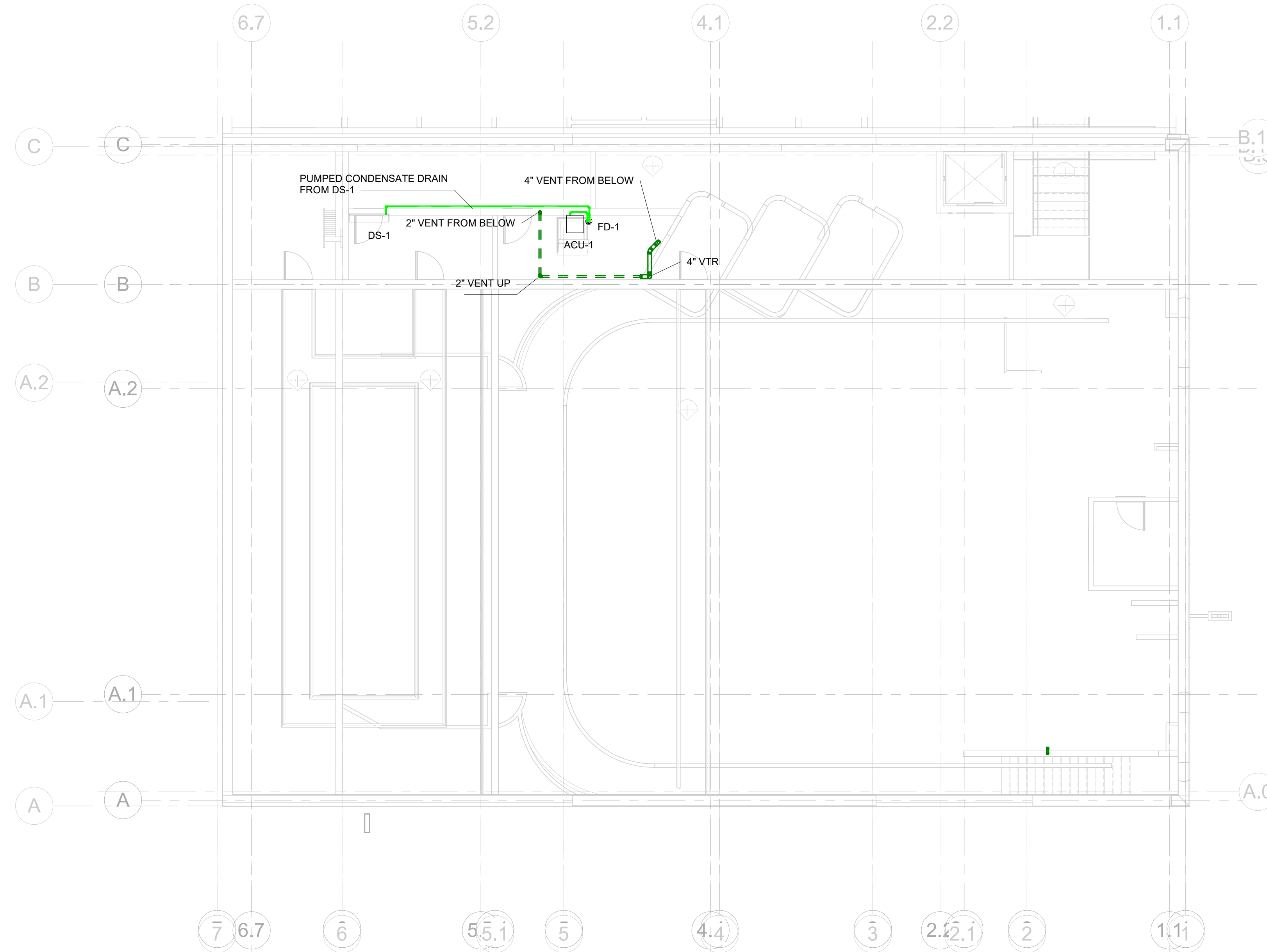
P.102

GENERAL NOTES

1. COORDINATE ROUTING OF PIPING AND EQUIPMENT WITH ALL TRADES PRIOR TO BEGINNING CONSTRUCTION.
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3. SEE SHEET P.102 FOR FIRST FLOOR DOMESTIC WATER.
4. SEE SHEET P.401 AND P.402 FOR ENLARGED PLUMBING PLANS.
5. SEE SHEET P.403 AND P.404 FOR PLUMBING ISOMETRIC DRAWINGS.
6. SEE SHEET P.501 AND P.502 FOR PLUMBING DETAILS.



1 SECOND FLOOR PLAN - SANITARY
 1/8" = 1'-0"



A New Construction Project:

**MSCCM -
 Ellis Theater
 Renovation**

Project Site Address:
 311 Byrd Ave.
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 39350

DAAD Project Number:
 17583

No:	SET:	DATE:
01	CD Set	08/11/21
02	REISSUE - NO CHANGE	10/13/21

Drawing:

PLUMBING SECOND
 FLOOR SANITARY

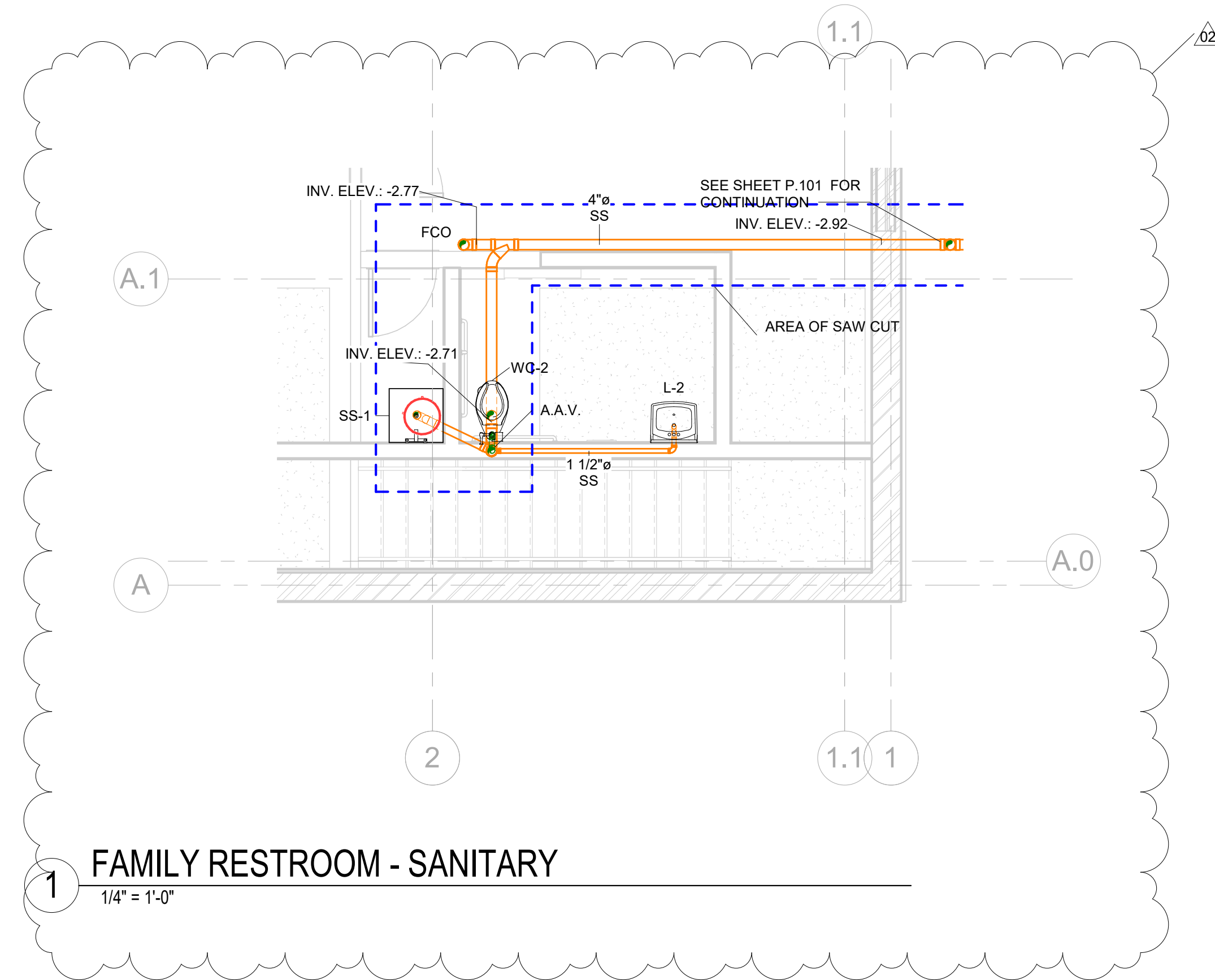
P.201

GENERAL NOTES

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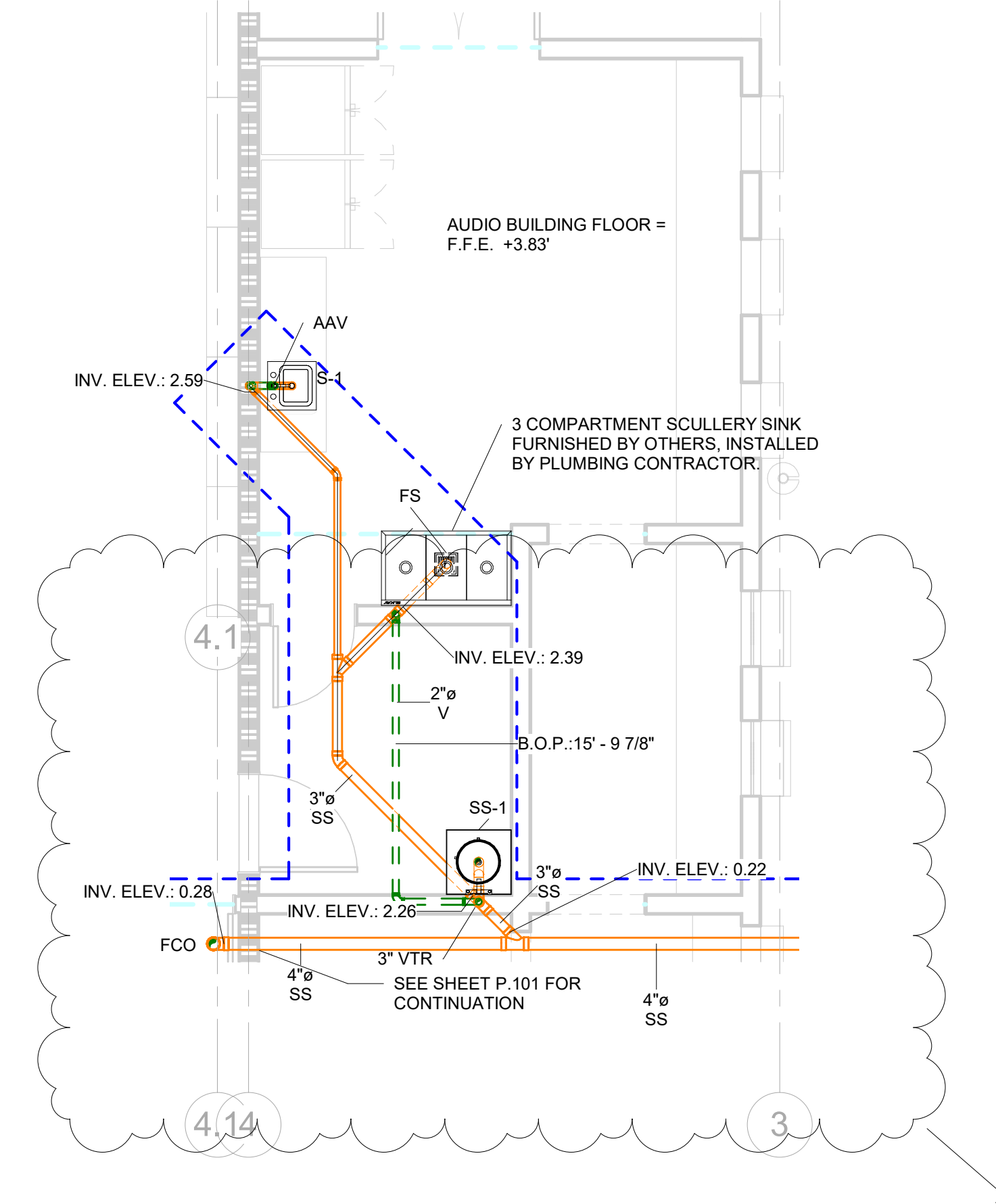
NOTES

1. SEE SHEET P.001 FOR FIXTURE SCHEDULE, WATER HEATER SCHEDULE AND PLUMBING LEGEND AND ABBREVIATIONS.
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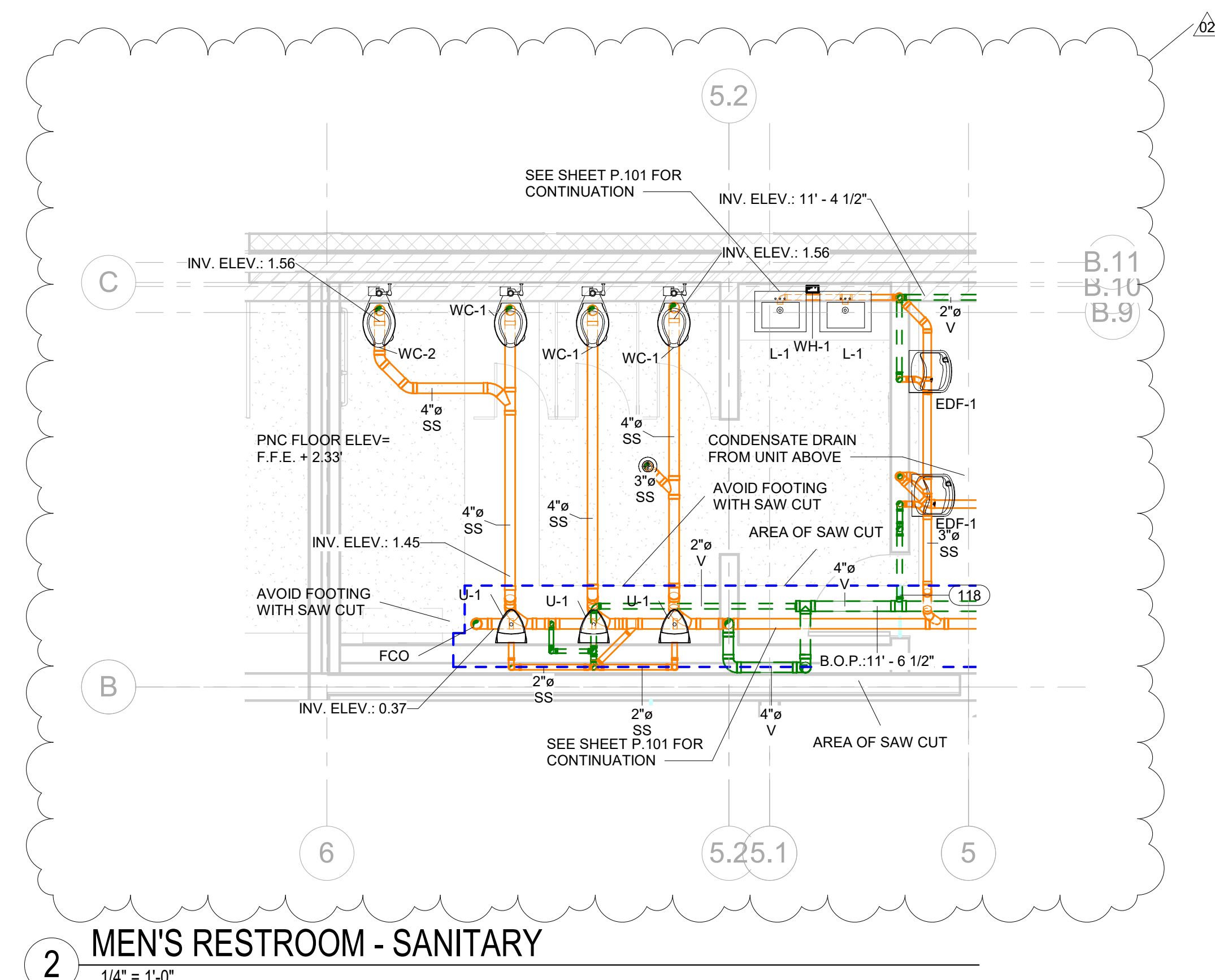


1 FAMILY RESTROOM - SANITARY
1/4" = 1'-0"

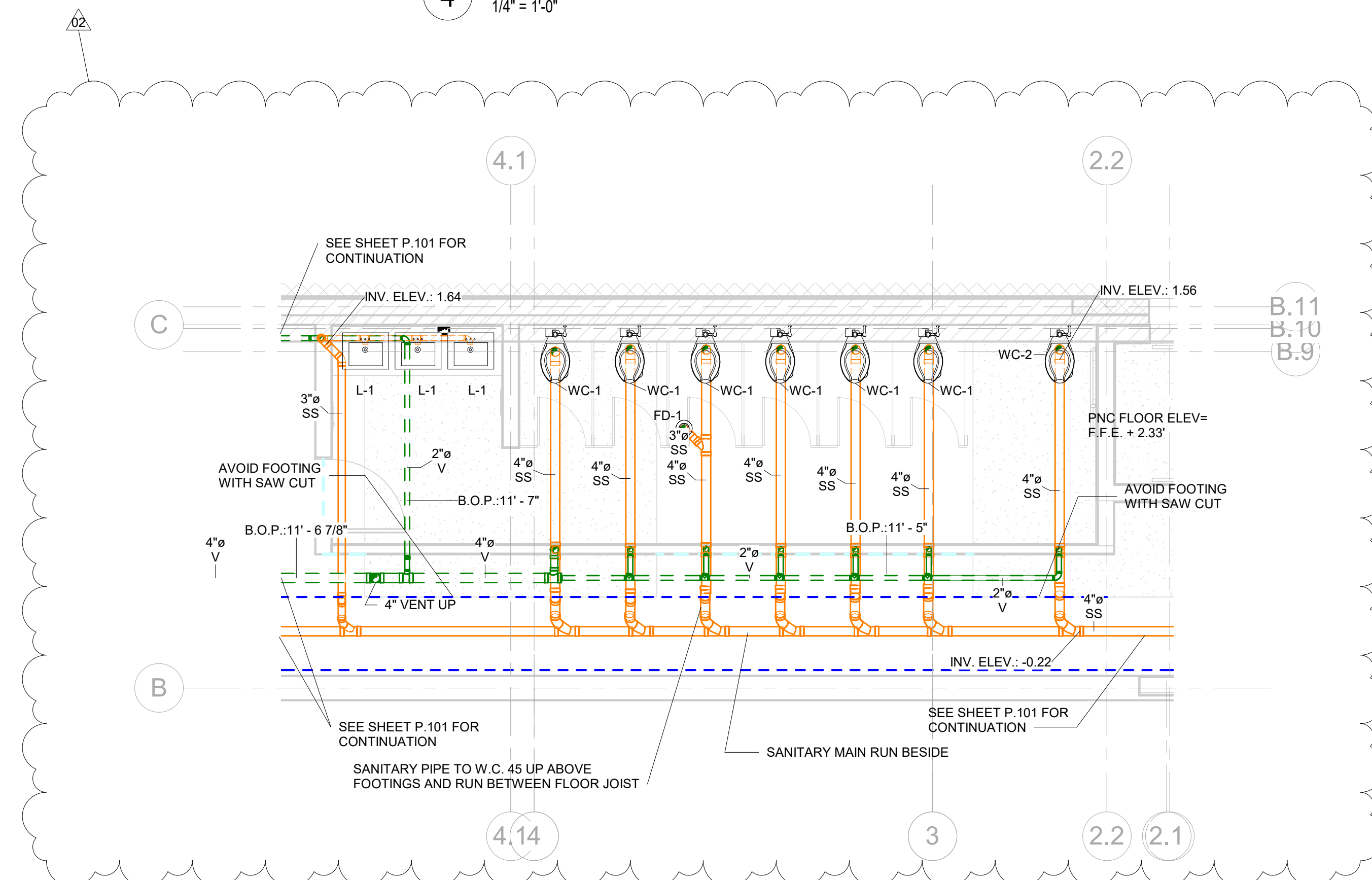
INVERT ELEVATIONS NOTED ARE REFERENCED TO ELLIS LOBBY FLOOR - F.F.E. = 0.00'



4 CONCESSION AREA - SANITARY
1/4" = 1'-0"



2 MEN'S RESTROOM - SANITARY
1/4" = 1'-0"



3 WOMEN'S RESTROOM - SANITARY
1/4" = 1'-0"

A New Construction Project:

MSCCM - Ellis Theater Renovation

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17583

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Drawing:

ENLARGED PLUMBING PLANS SANITARY

P.401

GENERAL NOTES

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A New Construction Project:

MSCCM - Ellis Theater Renovation

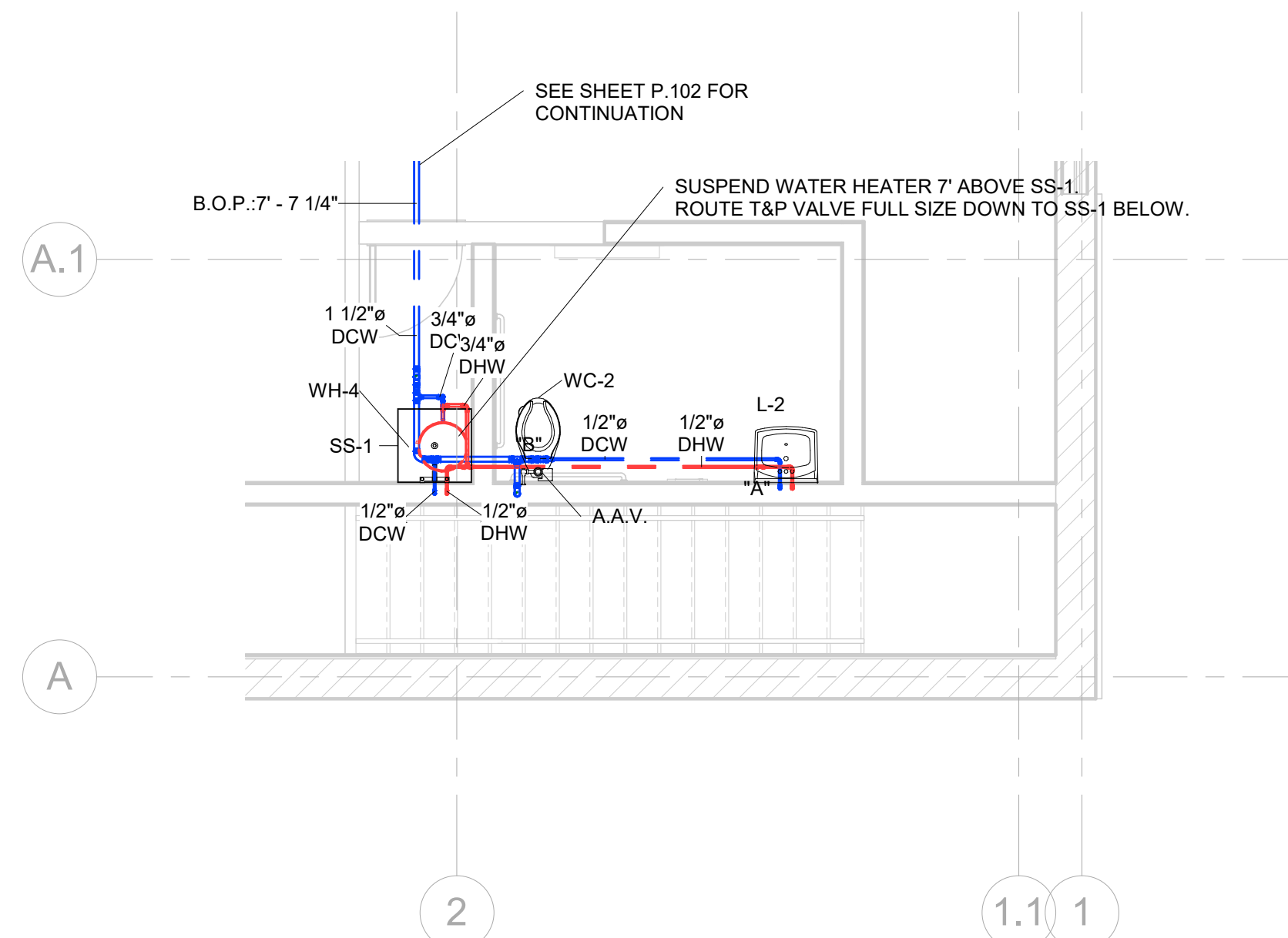
Project Site Address:
311 Byrd Ave.
Philadelphia, MS
39350

DAAD Project Number:
17583

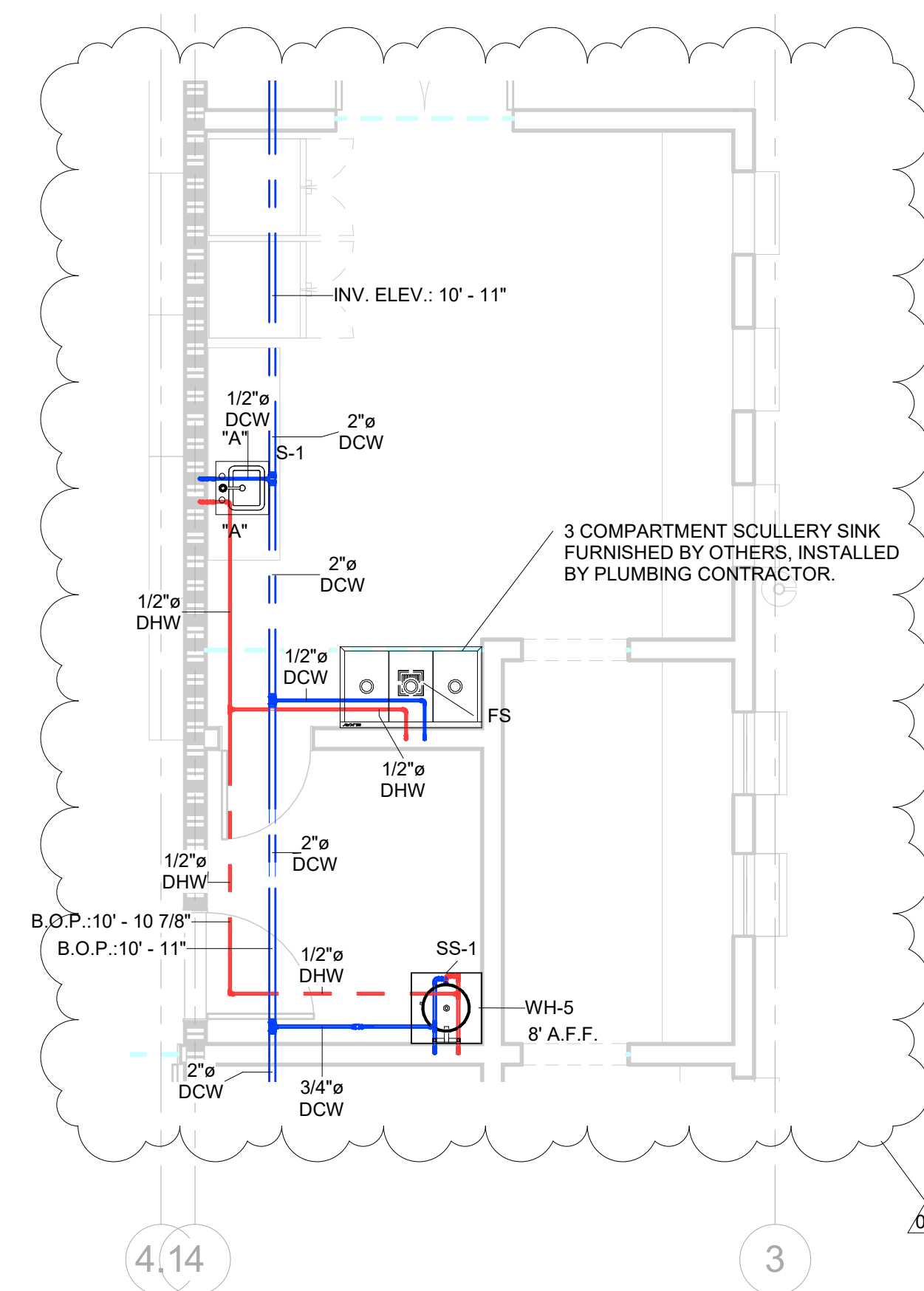
No:	SET:	DATE:
01	CD Set	08/11/21
02	REV. AS SHOWN	10/13/21

Drawing:
ENLARGED PLUMBING
PLANS DOMESTIC
WATER

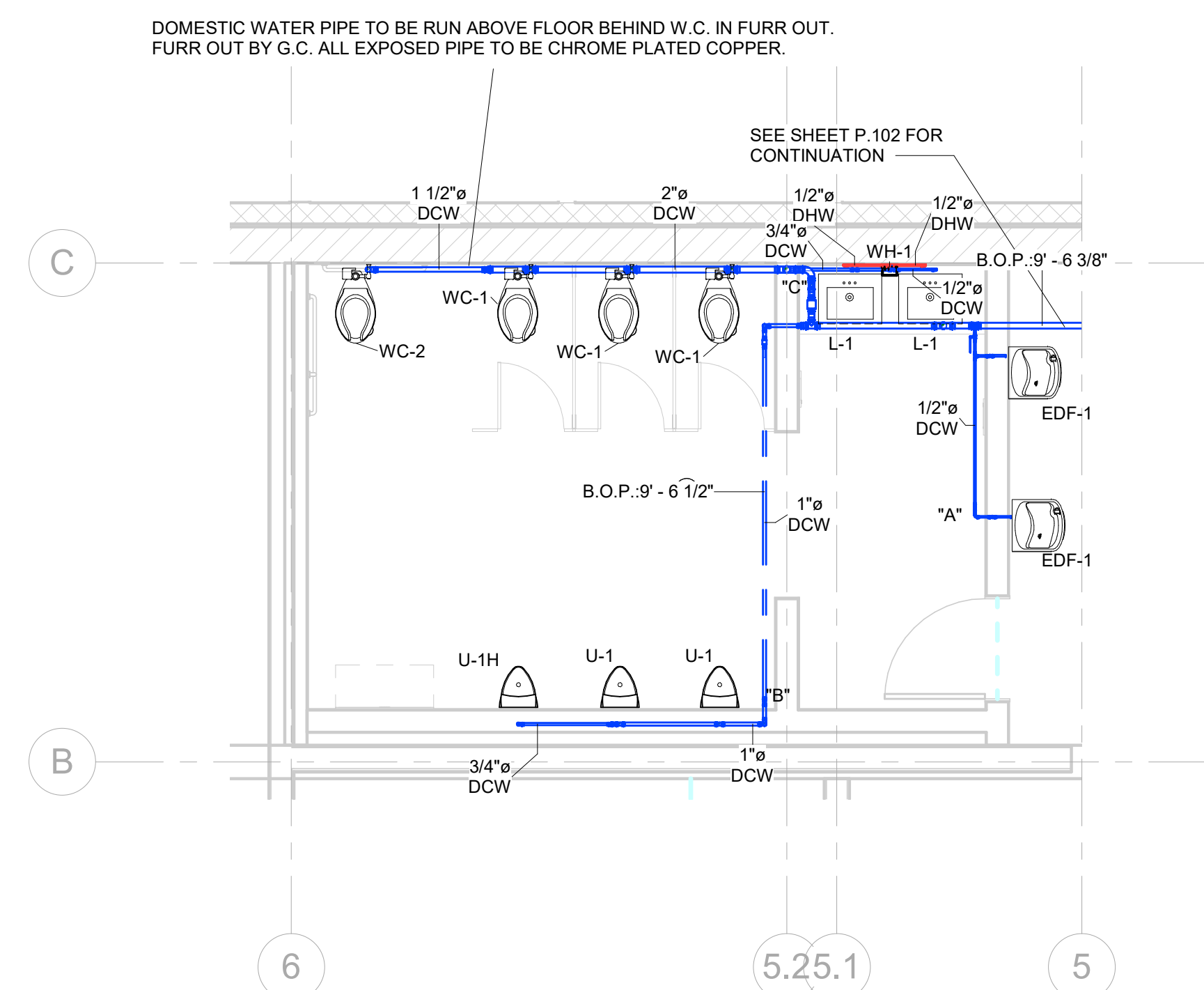
P.402



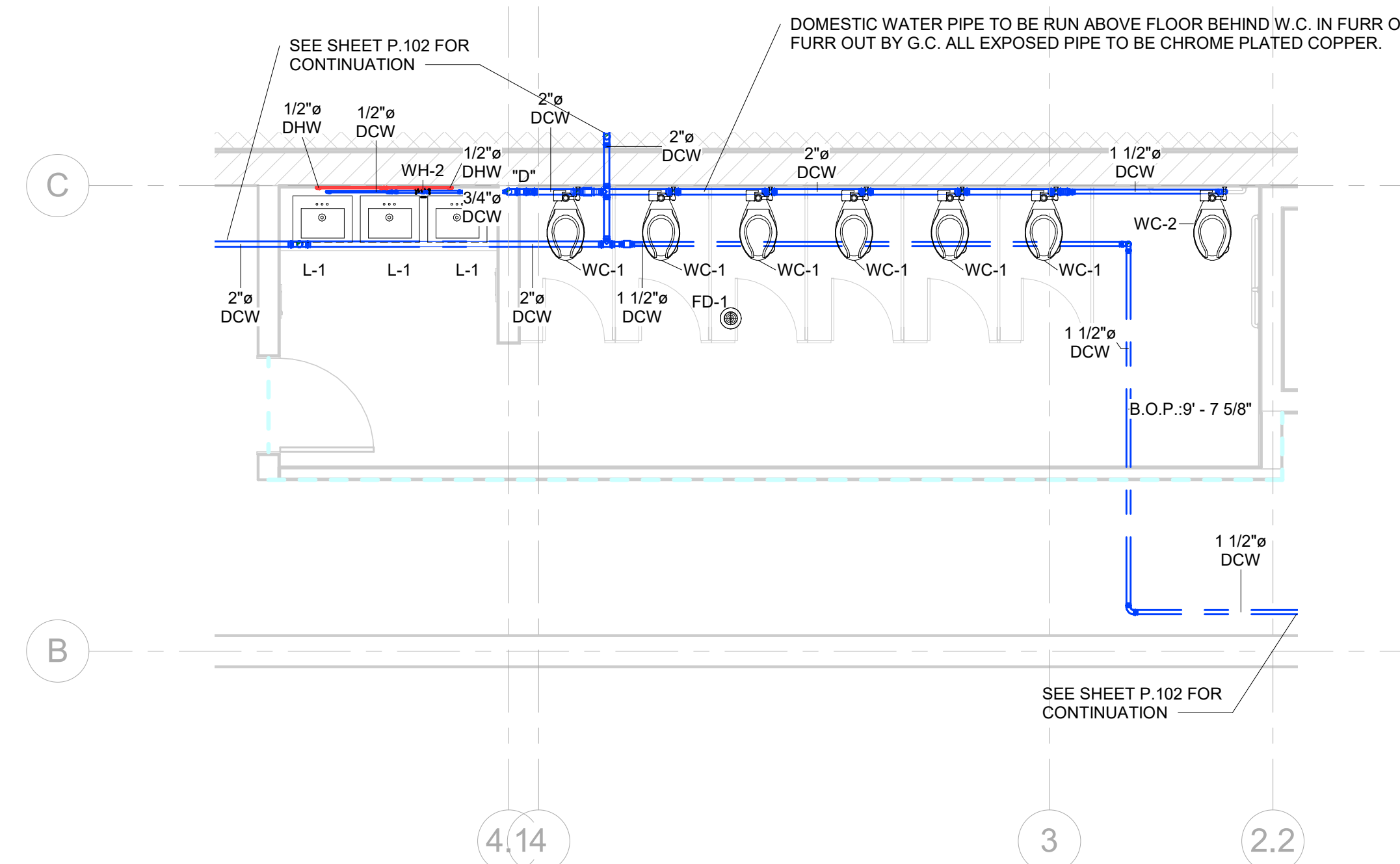
1 FAMILY RESTROOM - DOMESTIC WATER
1/4" = 1'-0"



4 CONCESSION AREA - DOMESTIC WATER
1/4" = 1'-0"



2 MEN'S RESTROOM - DOMESTIC WATER
1/4" = 1'-0"



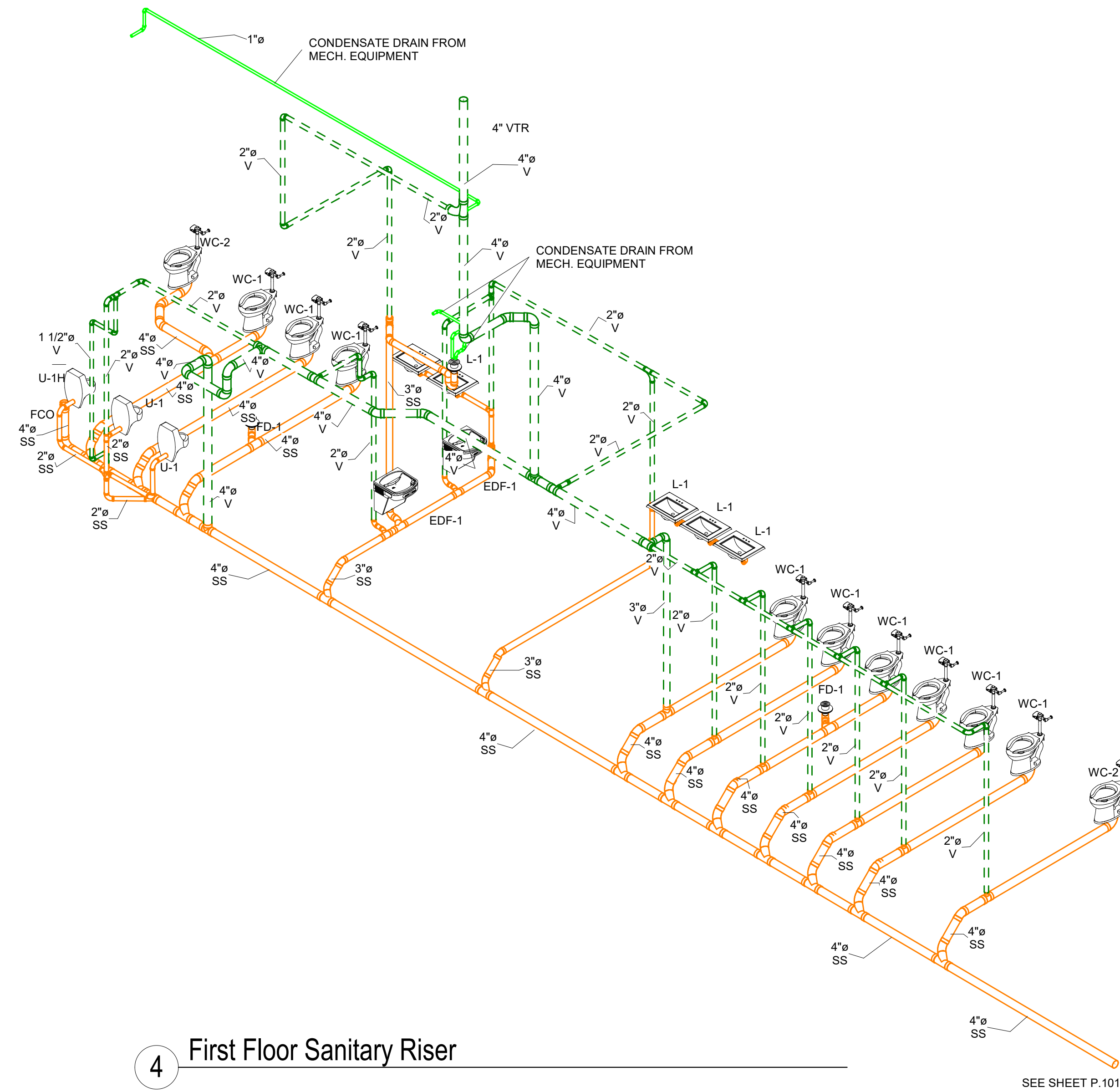
3 WOMEN'S RESTROOM - DOMESTIC WATER
1/4" = 1'-0"

GENERAL NOTES

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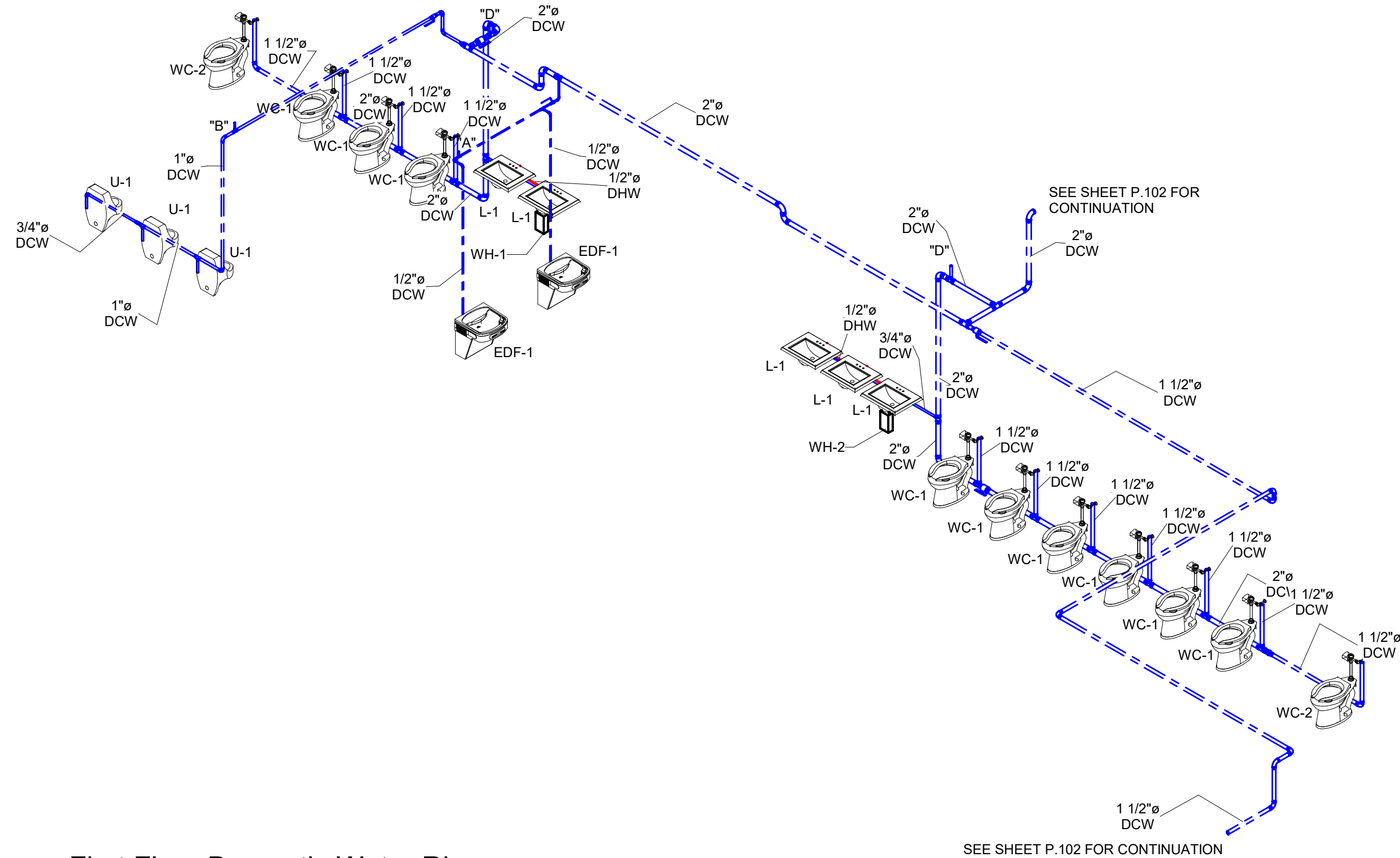
NOTES

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4. SEE SHEET P.201 FOR SECOND FLOOR PLUMBING PLANS.
5. SEE SHEET P.401 AND P.402 FOR ENLARGED PLUMBING PLANS.
6. SEE SHEET P.501 AND P.502 FOR PLUMBING DETAILS.



4 First Floor Sanitary Riser

SEE SHEET P.101 FOR CONTINUATION



1 First Floor Domestic Water Riser

SEE SHEET P.102 FOR CONTINUATION

A New Construction Project:

**MSCCM -
Ellis Theater
Renovation**

Project Site Address:
311 Byrd Ave.
Philadelphia, MS
39350

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01	CD Set	08/11/21
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Drawing:

PLUMBING ISOMETRIC
DRAWINGS

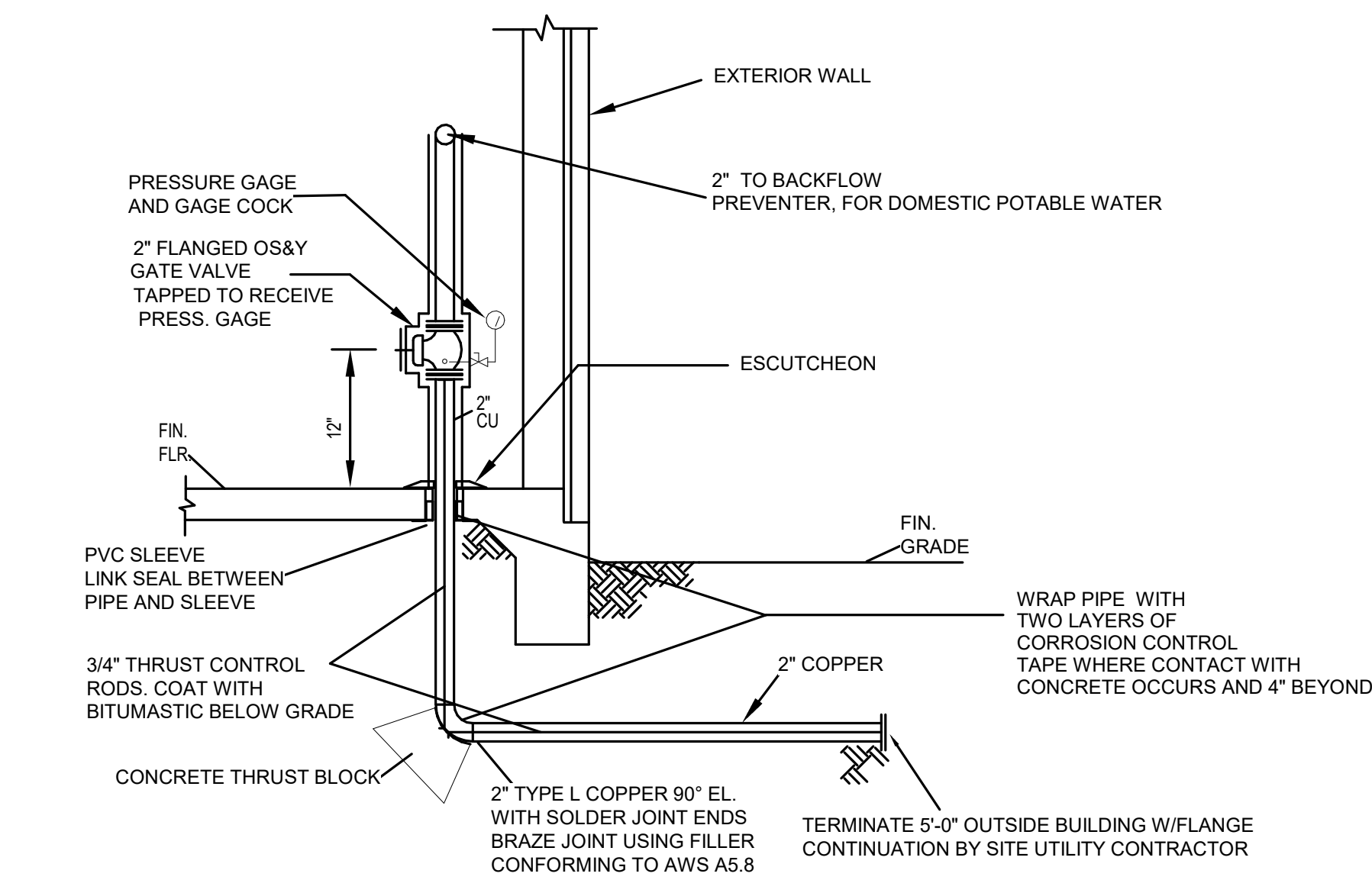
P.403

GENERAL NOTES

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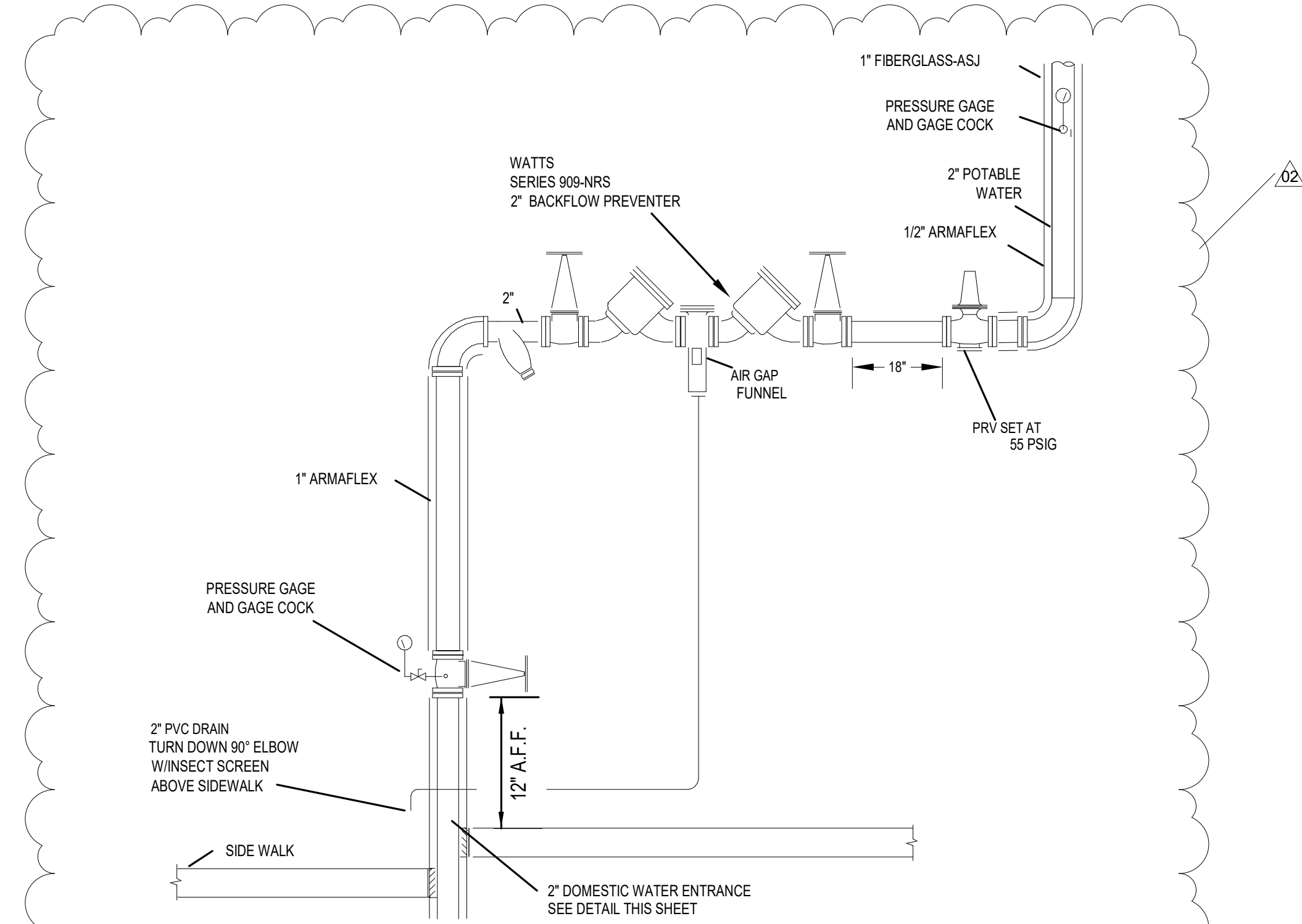
NOTES

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6. SEE SHEET P. AND P.404 FOR PLUMBING ISOMETRIC DRAWINGS.



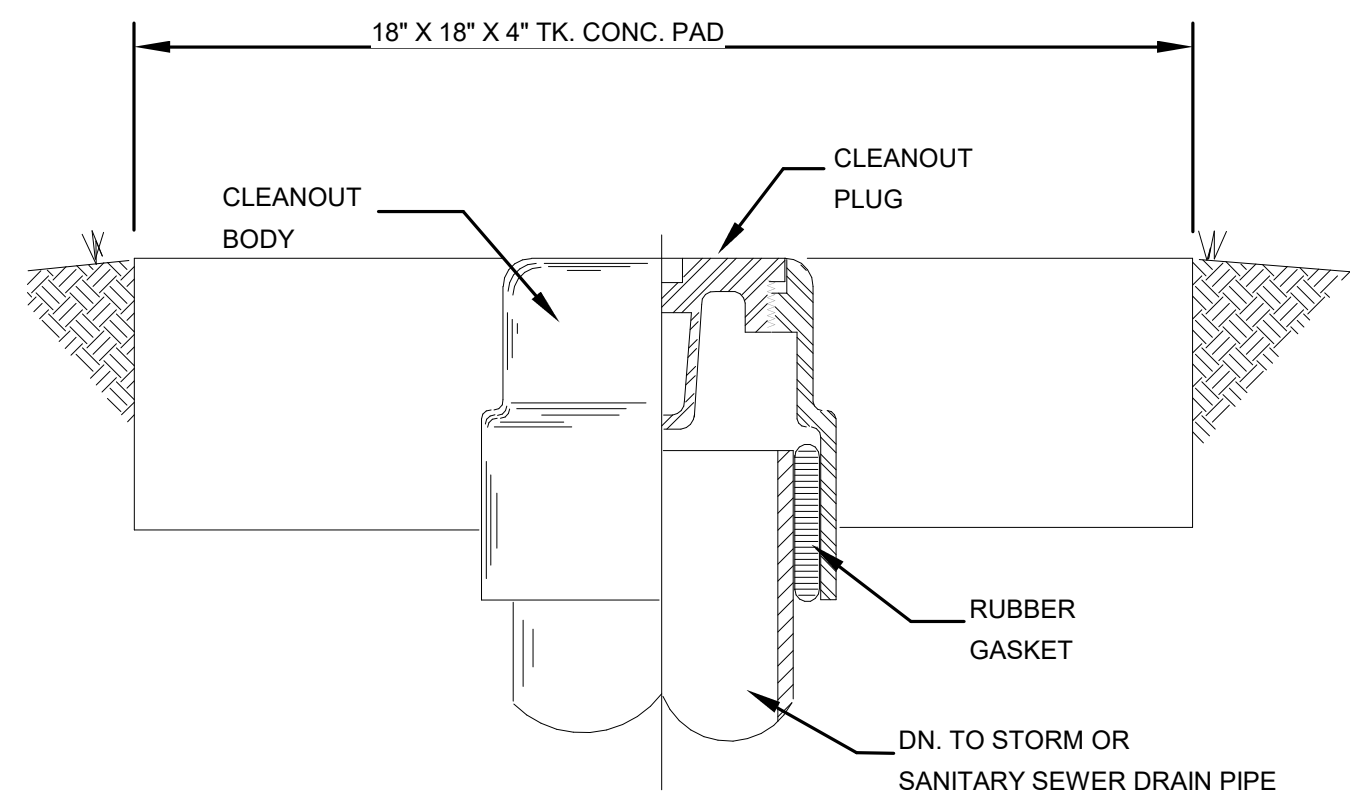
1 DOMESTIC WATER ENTRANCE

NOT TO SCALE



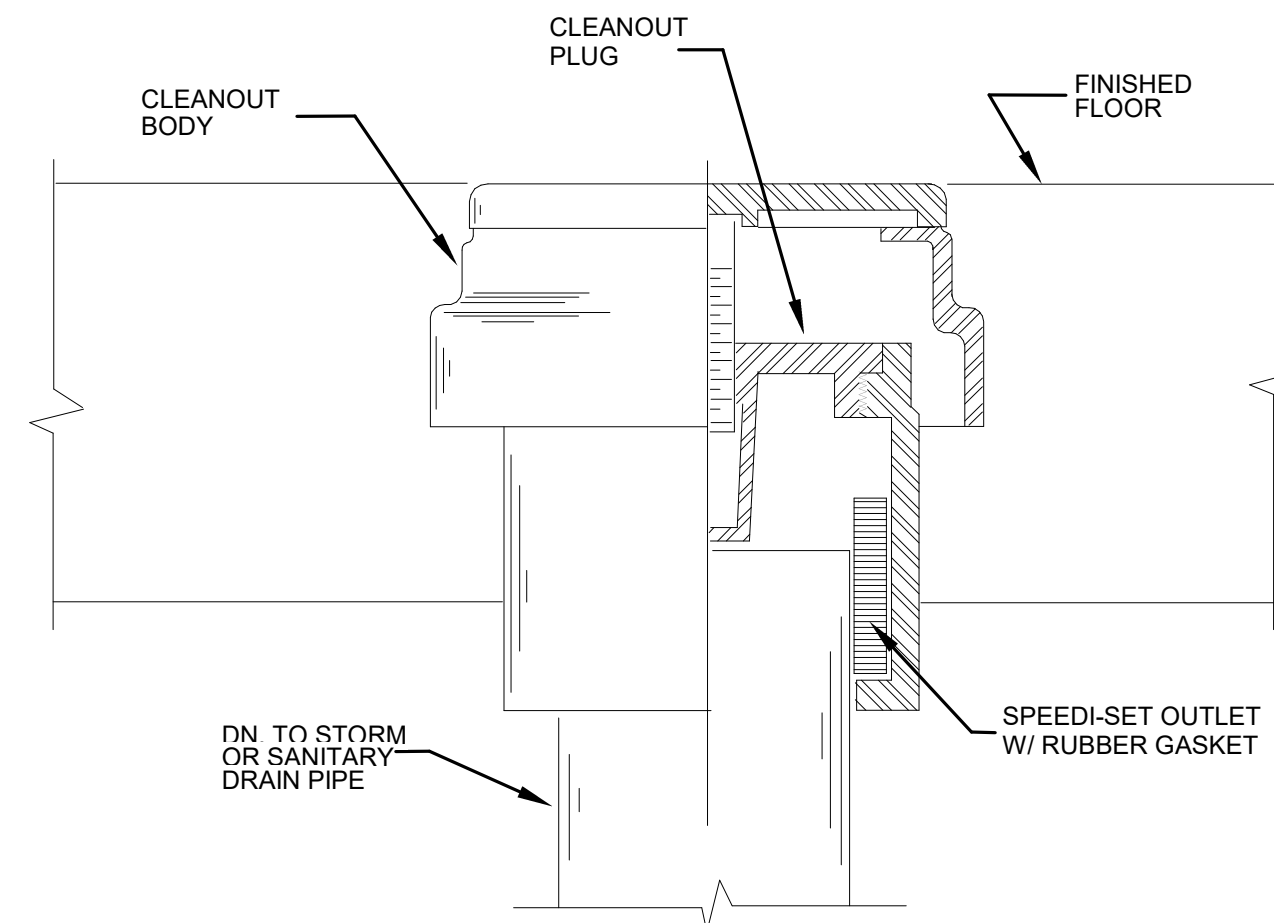
2 BACKFLOW PREVENTER DETAIL

NOT TO SCALE



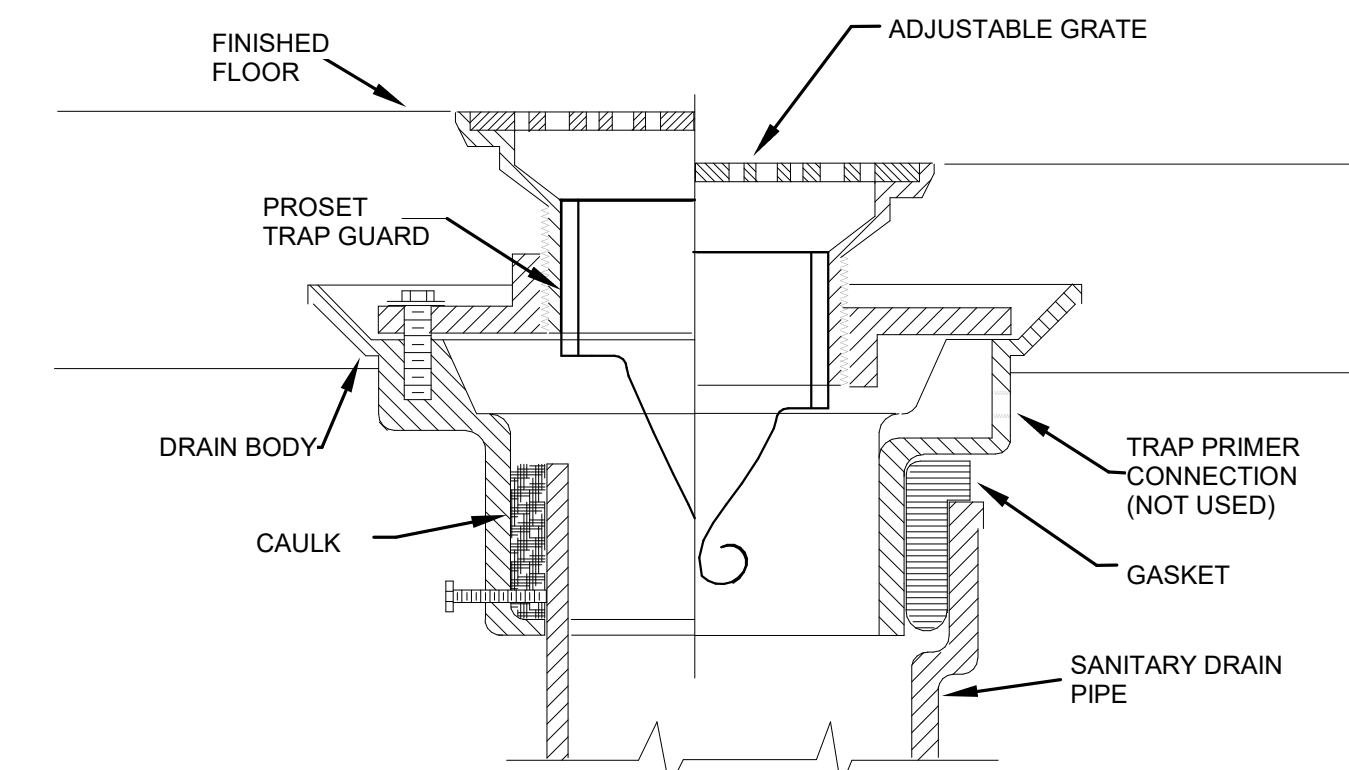
4 FGCO DETAIL

NOT TO SCALE



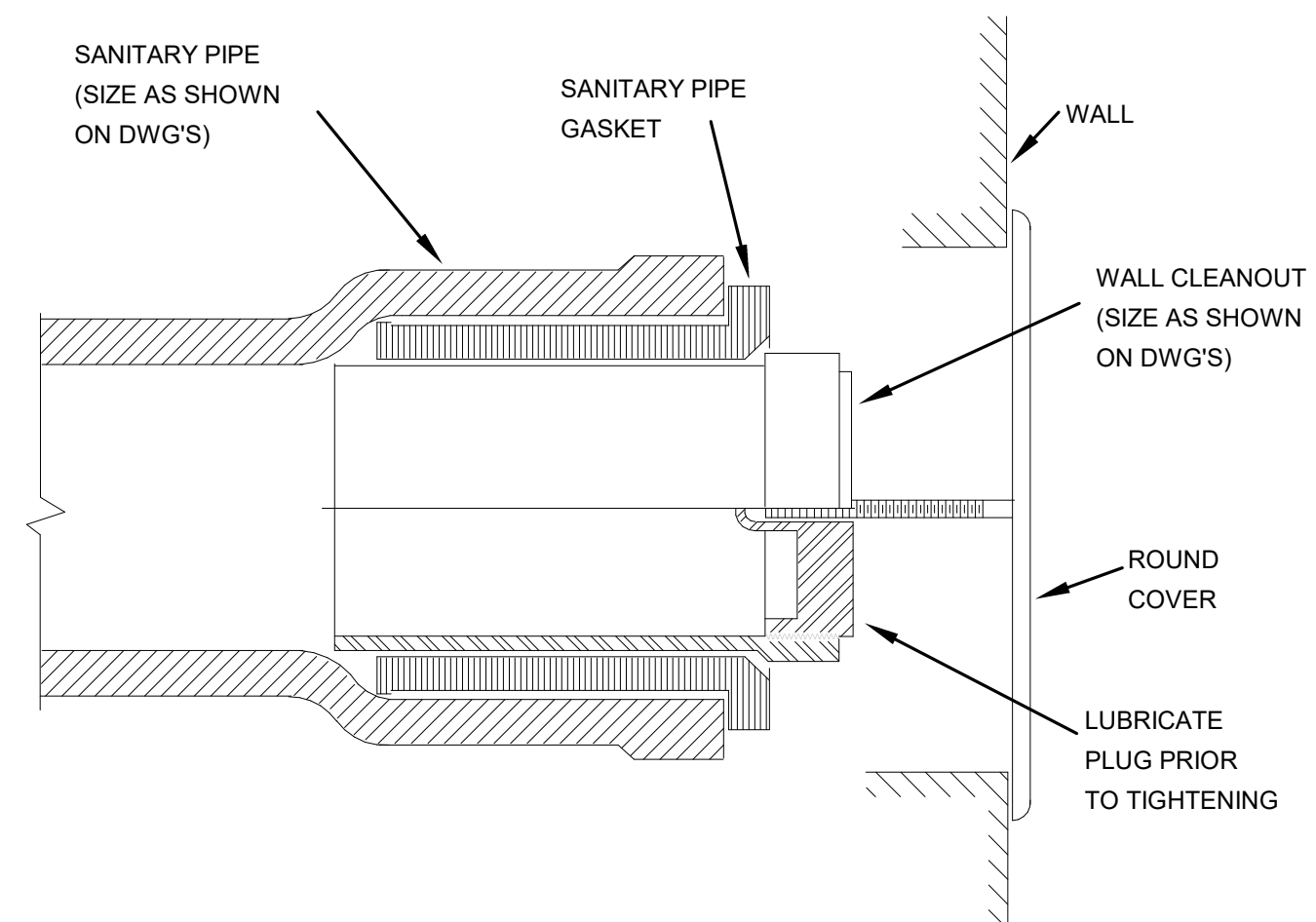
5 FLOOR CLEANOUT DETAIL

NOT TO SCALE



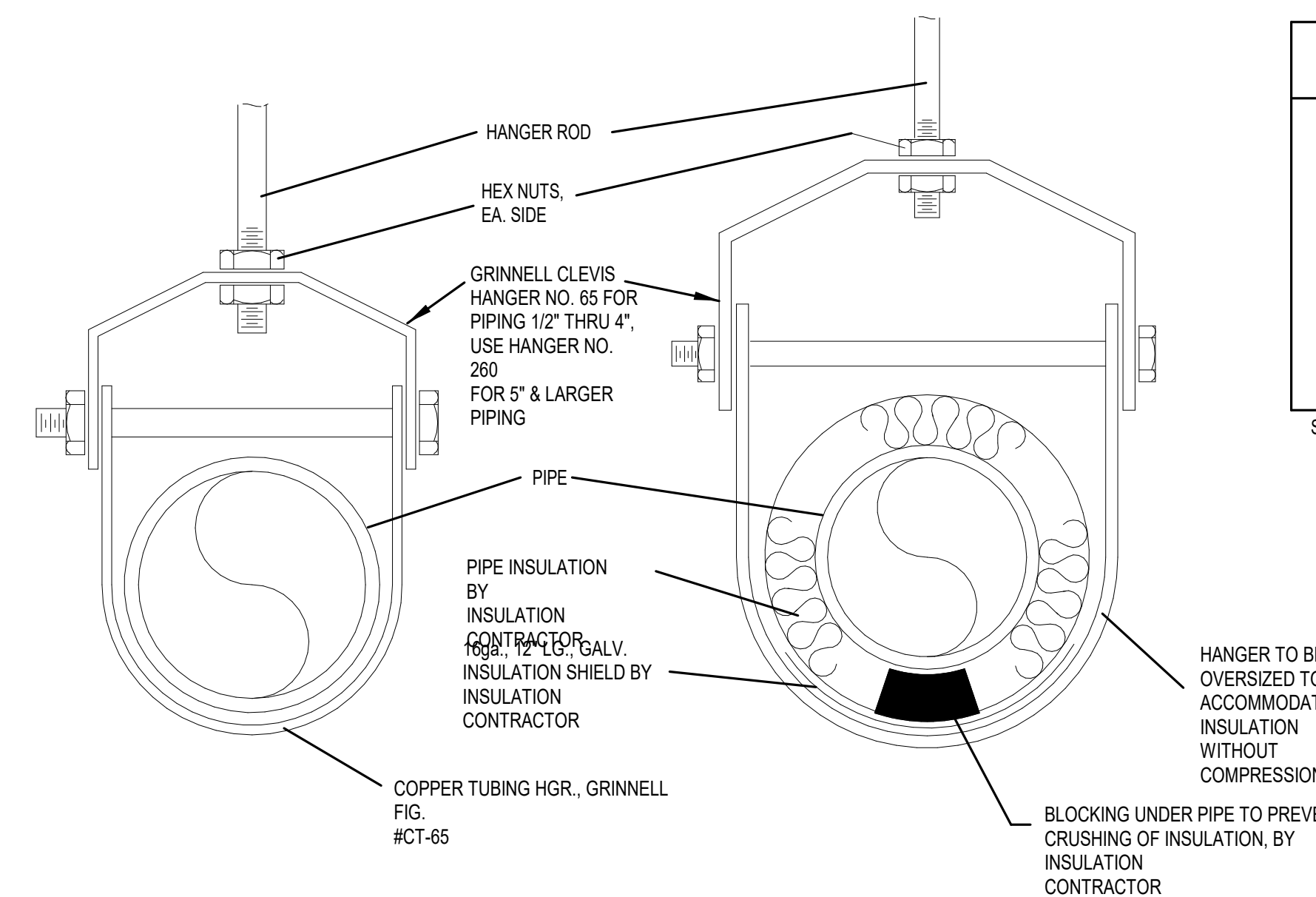
6 FLOOR DRAIN DETAIL

NOT TO SCALE



7 WALL CLEANOUT DETAIL

NOT TO SCALE



8 PIPE SUPPORT

NOT TO SCALE

PIPE SIZE	ROD SIZE	MAX. HGR SPC. COPPER PIPE	MAX. HGR SPC. STEEL PIPE	MAX. HGR SPC. PVC
1/2"	3/8"	5'	5'	4'
3/4"	3/8"	5'	5'	4'
1"	3/8"	6'	7'	4'
1 1/4"	3/8"	7'	7'	5'
1 1/2"	3/8"	8'	9'	5'
2"	3/8"	8'	10'	5'
2 1/2"	1/2"	9'	11'	6'
3"	1/2"	10'	12'	6'
4"	5/8"	12'	14'	6'

SOURCE: MSS SP-69

A New Construction Project:

MSCCM - Ellis Theater Renovation

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Philadelphia, MS
39350

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17583

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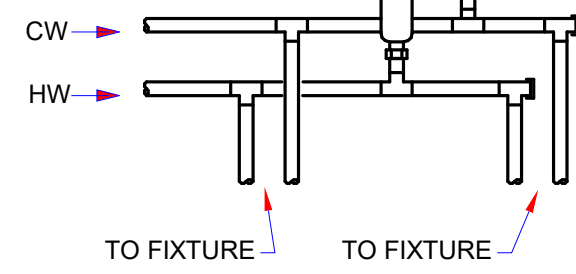
Drawing:

PLUMBING DETAILS

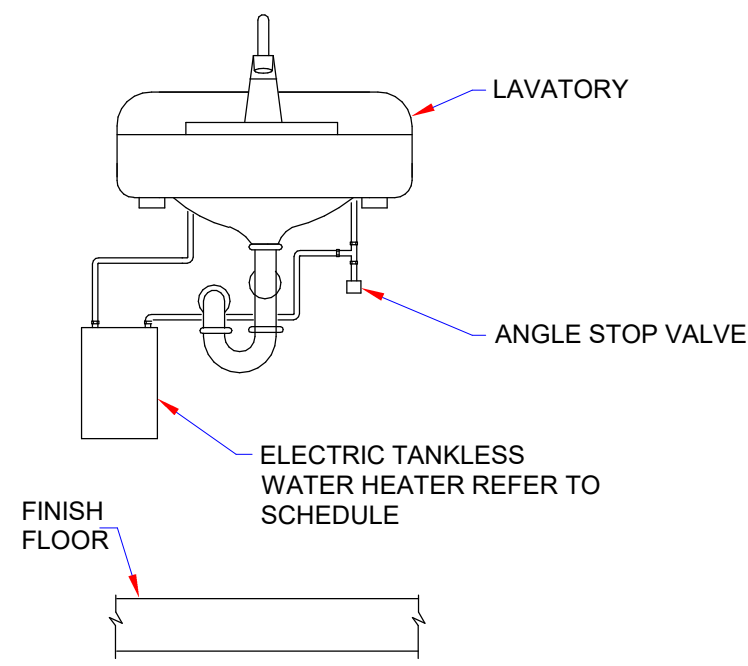
P.501

WATER HAMMER ARRESTOR
INSTALL AHEAD OF LAST FIXTURE
SERVED BY BRANCH. (TYP)

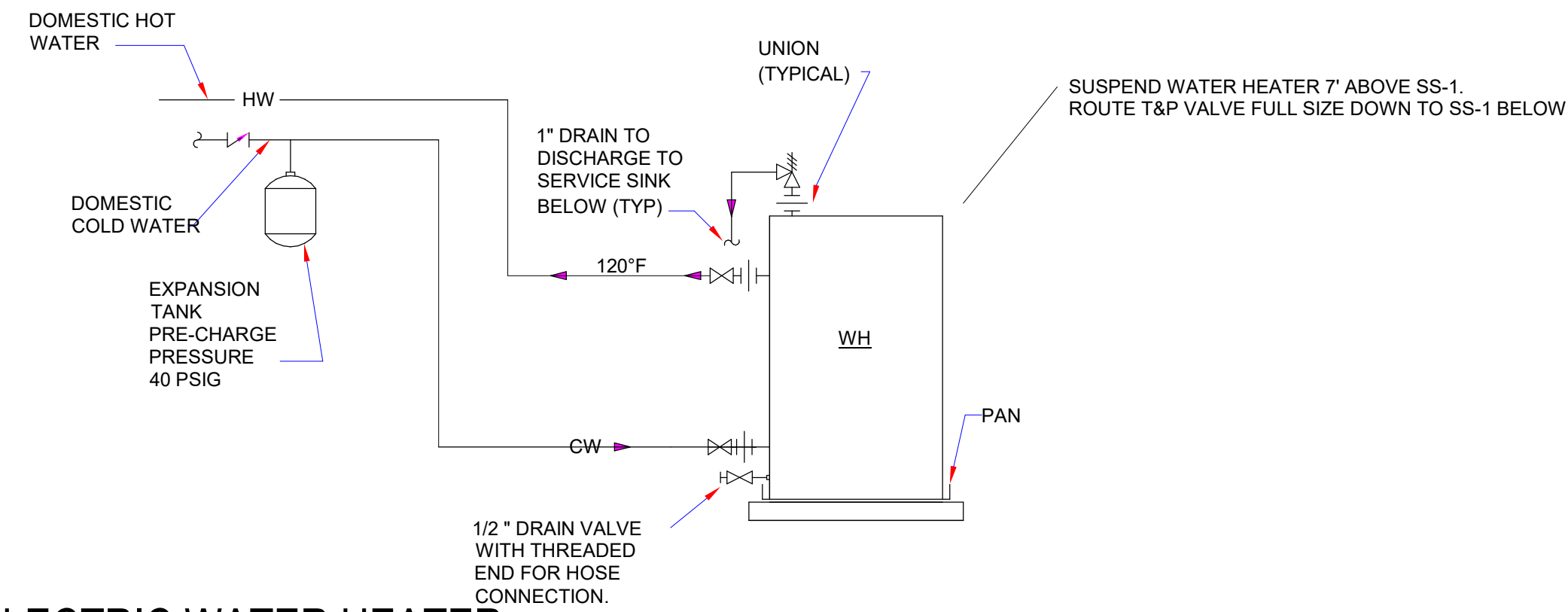
WATER ARRESTOR SCHEDULE		
PDI SYMBOL	FIXTURE UNIT RATING	SIZE
A	1-11	3/4"
B	12-32	1"
C	33-60	1"
D	61-113	1"
E	114-164	1"



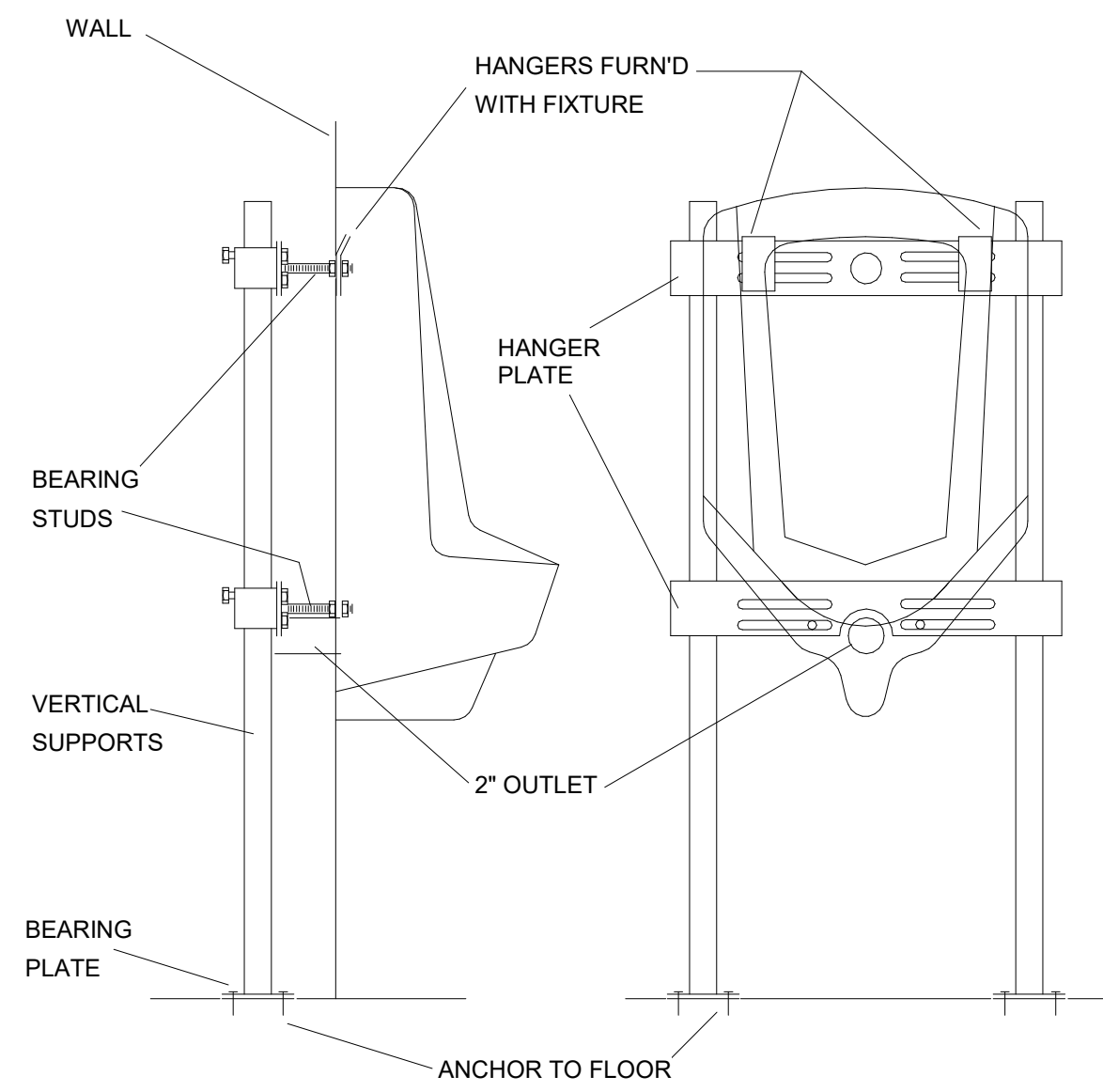
1 WATER HAMMER ARRESTER
1/8" = 1'-0"



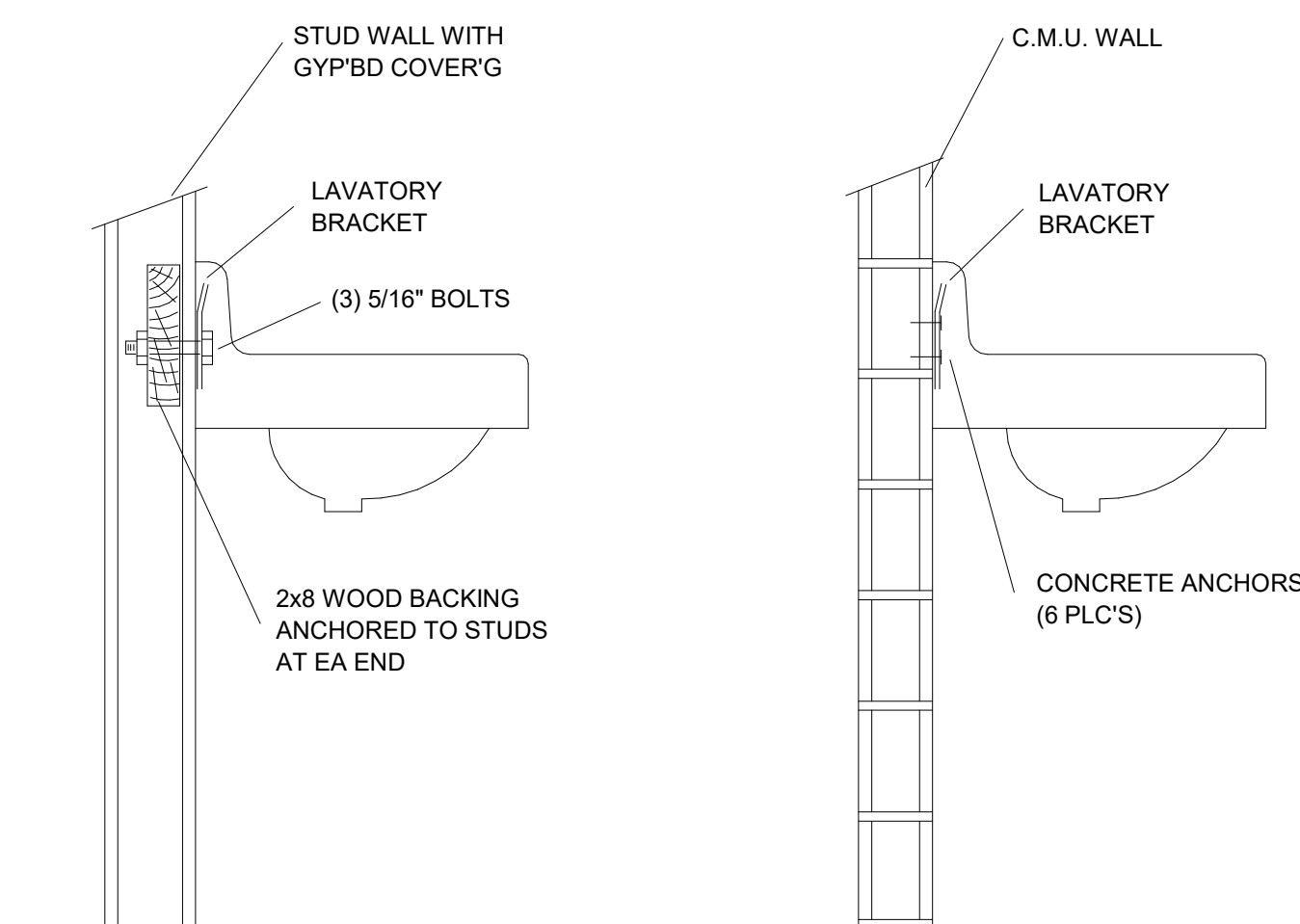
2 POINT OF USE ELECTRIC WATER HEATER
1/8" = 1'-0"



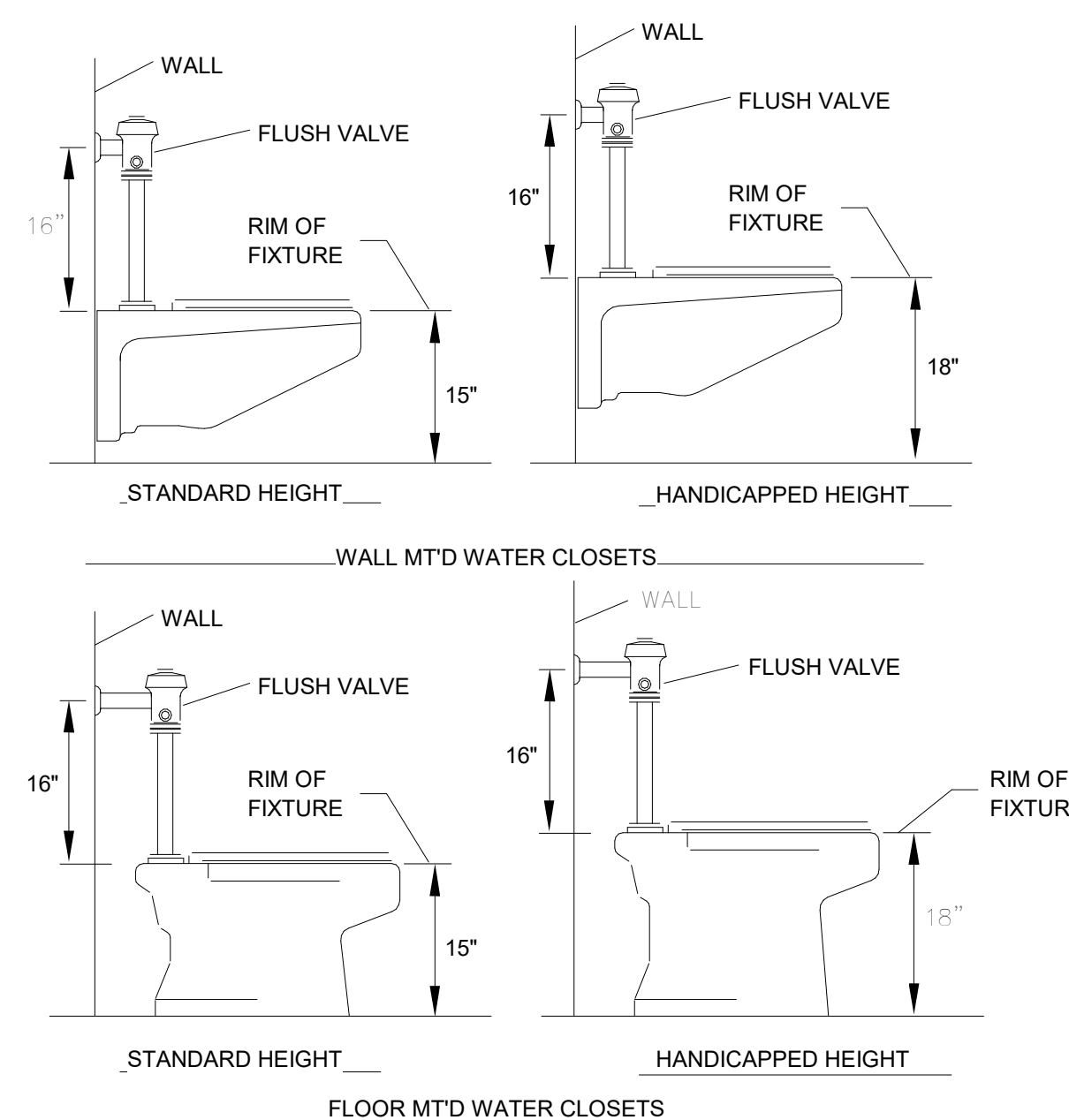
4 ELECTRIC WATER HEATER
1/8" = 1'-0"



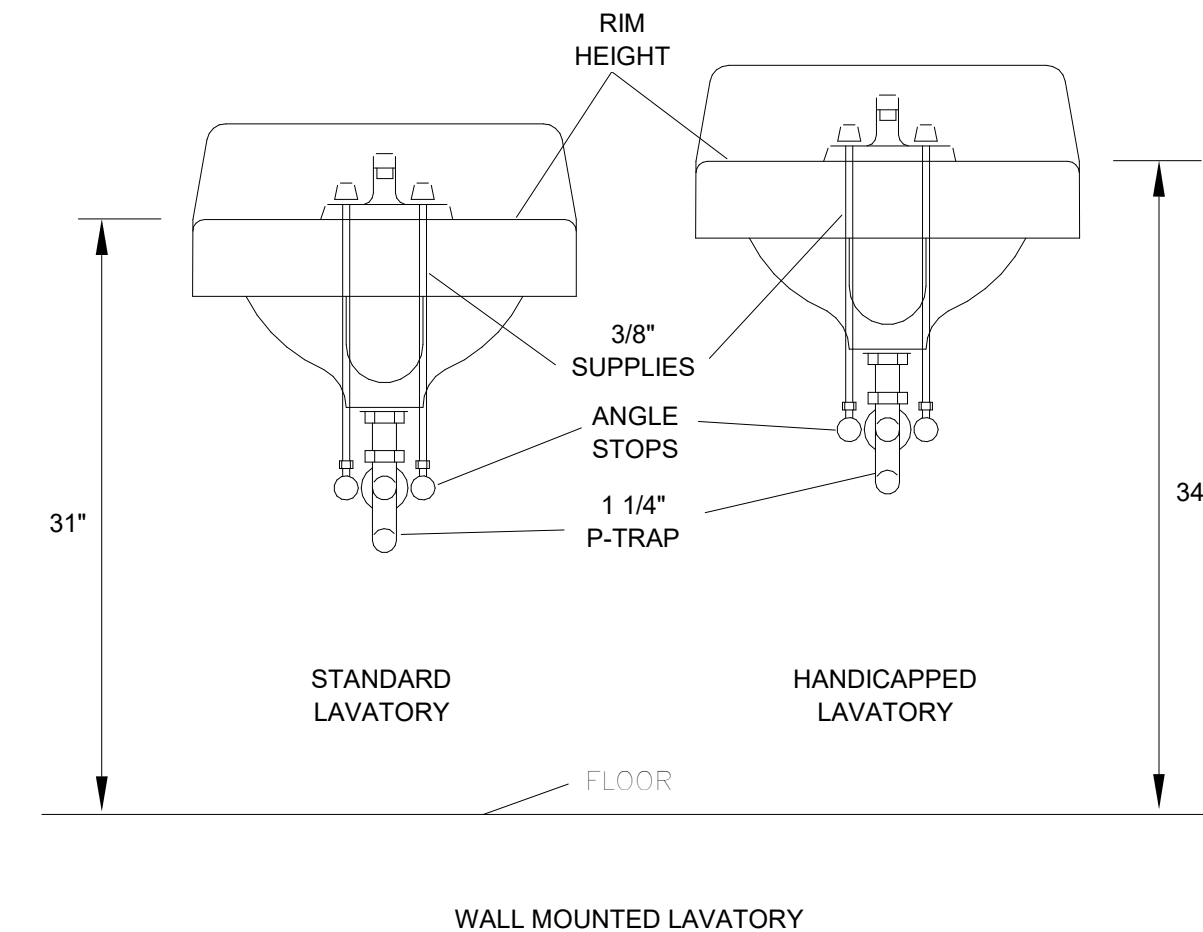
3 URINAL SUPPORT DETAIL
1/8" = 1'-0"



6 LAVATORY SUPPORT DETAIL
1/8" = 1'-0"



5 FIXTURE MOUNTING HEIGHTS
1/8" = 1'-0"



GENERAL NOTES

- COORDINATE ROUTING OF PIPING AND EQUIPMENT WITH ALL TRADES PRIOR TO BEGINNING CONSTRUCTION.
- COORDINATE REQUIREMENTS FOR ALL WALL AND FLOOR PENETRATIONS WITH STRUCTURAL ENGINEER.
- PLUMBING CONTRACTOR RESPONSIBLE FOR ALL SANITARY WASTE, DOMESTIC WATER PIPING INSIDE BUILDING TO FIVE FEET OUTSIDE BUILDING FOOTPRINT. CONTINUATION OF UTILITIES PAST FIVE FEET OUTSIDE BUILDING BY SITE UTILITY CONTRACTOR.
- REVIEW ARCHITECTURAL LIFE SAFETY PLANS FOR LOCATIONS OF RATED ASSEMBLIES. PROVIDE FIRE CAULK, AS REQUIRED, FOR ALL RATED PENETRATIONS.

NOTES

- SEE SHEET P.001 FOR FIXTURE SCHEDULE, WATER HEATER SCHEDULE AND PLUMBING LEGEND AND ABBREVIATIONS.
- SEE SHEET P.101 FOR FIRST FLOOR SANITARY.
- SEE SHEET P.102 FOR FIRST FLOOR DOMESTIC WATER.
- SEE SHEET P.201 FOR SECOND FLOOR PLUMBING PLANS.
- SEE SHEET P.401 AND P.402 FOR ENLARGED PLUMBING PLANS.
- SEE SHEET P. AND P.404 FOR PLUMBING ISOMETRIC DRAWINGS.



A New Construction Project:

**MSCCM -
Ellis Theater
Renovation**

Project Site Address:

311 Byrd Ave.
Philadelphia, MS
39350

DAAD Project Number:

17583

No:	SET:	DATE:
01	CD Set	08/11/21
02	REISSUE - NO CHANGE	10/13/20

Drawing:

PLUMBING DETAILS

P.502