

BVH ARCHITECTURE

ADDENDUM

PROJECT:	NSC HVAC Replacement and Window Restoration	PROJECT NO.:	BVH: L14077 OCC: 201405
TO:	Prospective Bidders	DATE:	05/16/2018
FROM:	BVH Architecture	ADDENDUM NO.:	5

This Addendum is issued by the Architect to all bidders of record prior to receipt of proposals. Bidders shall acknowledge receipt of this addendum by so indicating on the Proposal Form. Failure to do so may subject Bidder to disqualification.

All information and instructions given herein shall become a part of the Contract Documents.

GENERAL

1. See the attached Addendum form from Alvine Engineering for additional items.

PROJECT MANUAL

1. The included and referenced AIA A101, AIA A201, 00 72 00 General Conditions and 00 73 00 Special Conditions are semi-final draft versions. No modifications to these documents will be completed at this time. Any final changes within these documents may be negotiated with the chosen final bidder.
2. 001113 Advertisement for Bids
 - a. CHANGE Section 1.2, A, 2 to read as follows:
 - i. 2. Bid Time: 2:00 p.m., local time for the following:
 - a. Section 004113 "Bid Form", Section 004113.1 "Bid Form - Ductwork Cleaning", Section 004321 "Allowances Form".
 - b. ADD NEW Section 1.2, A, 3 as follows:
 - i. 3. Bid Time: 2:30 p.m., local time for the following:
 - a. Section 004322 "Unit Prices Form", Section 004322.1 "Unit Prices Form Mechanical" and Section 004323 "Alternates Form".
 - c. Section 1.2, A, 3 is changed to Section 1.2, A, 4. The wording did not change.
 - d. ADD to Section 1.2, B
 - i. Add to the end of the sentence after the word aloud, "..... at 2:30 p.m. at the Capitol in Hearing Room 1507."
 - e. CHANGE Section 1.7, B.
 - i. DELETE Part 1, d: Lund-Ross Constructors
 - ii. DELETE Part 3, d: MMC Mechanical Contractors, Inc.
 - iii. DELETE Part 5, d: Viking Automatic Sprinkler Company
 - iv. Part 7: DELETE the sentence "(Not part of this contract but indicated here for reference only)"
 - f. See attached revised section.

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3. 004113 Bid Form
 - a. Per Addendum 2: Project Manual Item 3, b
 - i. DELETE all reference to Duct Work Cleaning. DELETE 1.2, D and 1.3, B.
 - b. Per Addendum 2, CHANGE section 1.2, C, 5:
 - i. "Pre-Qualified Subcontractors. Identify the pre-qualified subcontractors included within your proposal, **from the list indicated in Section 001113**, on the lines below."
 1. Window Restoration:
 2. Mechanical:
 3. Electrical:
 4. Fire Protection:
 5. Fire Alarm:
 6. Hazardous Materials:
 - c. ADD to Section 1.3 A
 - i. Add to end of the paragraph: "One Bid Bond may be submitted to include the total of all three Phase 1, Phase A and Phase B amounts."
 - d. ADD to Section 1.5, A
 - i. ADD Item 4: Addendum No. 4, dated _____.
 - ii. ADD Item 5: Addendum No. 5, dated _____.
 - e. See attached revised form.
4. 004113.1 Bid Form – Ductwork Cleaning
 - a. ADD new Spec Section for Duct Work Cleaning Bids
 - i. See attached NEW Bid form.
 - b. Clarifications:
 - i. The duct cleaning scope shall be as shown on M sheets and as contained in Project Manual Section 23 01 30.51.
 - ii. The duct cleaning contractor shall coordinate with and be under the direction of the project's Mechanical Contractor.
 - iii. The OCC will contract directly with the Duct Cleaning company for this work.
 - iv. The Duct Cleaning company shall submit their bid using the new bid form. They shall submit this directly to the owner. This form shall be due at same time and location as all other bids.
5. 004322 Unit Prices Form
 - a. ADD: 1.3, L:
 - i. Unit Price No. B-1: Sheet Piling
 1. _____ Dollars (\$_____) per unit.
 - b. See attached revised form.
6. 004322.1 Unit Prices Form Mechanical
 - a. ADD: Page 004322.1 – 1, Paragraph 1. 3A:
 - i. "Assume all unit prices are based on work being installed at 9'-0" AFF."
7. 004393 – Bid Submittal Checklist
 - a. DELETE: Items 1.2, C, 12 & 13
 - b. See attached revised section.
8. 011000 Summary:
 - a. CLARIFICATION: 1.14, E: Temporary Heat
 - i. There are no preapproved temporary heating methods, just the OCC's desire to know

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what the proposed systems are and to have the opportunity to keep out heating systems they deem unsafe or that might damage the building's historic fabric.

9. 012200 – Unit Prices

- a. ADD: 3.1, K: Unit Price No. B-1: Sheet Piling
 - i. 1. Description: If granular soils or rubble fill are encountered in the excavation, shoring with sheet piling may be necessary if the sides of the excavation are not stable to meet OSHA Regulations. Assume square foot cost for sheet piling equals 4,200 square foot. Sheet Piling Shoring to be designed and certified by contractor if needed.
 - ii. 2. Unit of Measurement: Square Foot

10. 012300 Alternates, Per Addendum 2:

- a. The verbiage that read as “CHANGE: 3.1, B Alternate No. 2: Kitchen Alternate, Base Bid: NO CHANGES” indicates that NO changes were to be made to the Contract Documents in any regard as associated with ALL of the base bid work indicated on the Contract Documents, for all disciplines. The only changes for Addendum 2 were clarifications for the Alternate portion, as indicated in Addendum 2.
- b. For additional clarifications about Alternate 2, please also refer to Addendum 2, Drawings Section, Item 2.

11. 012300 Alternates

- a. ADD to Item 3.1, D, 2 (Alternate No 4): “Grade to Subgrade per plan contours. Any additional final grading, top soil requirements or finishing conditions will be evaluated after bidding.”

12. 080351 Restoration of Steel Windows

- a. ADD: 1.3, A, 7:
 - i. Oil-based glazing putty.
- b. ADD Section 2.9: Oil-Based Putty For Non-Stop Glazing Metal To Glass
- c. ADD: 2.9, A: Putty Seal: in locations with exposed putty glazing at the interior or exterior. All putty at window types with existing putty glazing locations shall be painted to match the window frame color.
- d. ADD: 2.9, A, 1: Manufacturers
 - i. Abatron Inc.: Sarco Type M Multiglaze
 - ii. Or approved equal
- e. ADD: 3.2, C, 1 as follows:
 - i. The existing hinges are typically riveted into the sash and frame rather than bolted. The existing hinges are typically brass rather than steel. These hinges are to be reused. The riveted connections on the sash side should be replaced with removable bolted connections and nuts so that the sash operate smoothly but can be removed in the future for maintenance. The bolted connections should not hinder operation of the sash in any way and should not have a visual impact on the windows when the sash are closed. Some of the hinges may require new hinge pins. The hinges should not be painted but left in their present patinated state. If patination is removed during the restoration process than the metal should be re-patinated.

13. 099114 Painting of Steel Windows

- a. ADD 1.3, A, 6:
 - i. Painting of putty glazing
- b. ADD Section 2.6: Painting of putty glazing
 - i. All putty at window types with existing putty glazing locations shall be painted to match

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the window frame color. Painting of the putty should take place after the putty has sufficiently cured to support a paint coating.

ii. Sherwin-Williams Duration Exterior Latex Gloss K 34 series

14. See the attached Addendum form from Alvine Engineering for additional specification items.

DRAWINGS

1. See the attached Addendum form from Alvine Engineering for additional drawing items.
2. C9.5 PB - Parking Lot Area Irrigation Construction Plan
 - a. CHANGE the entire sheet to be Alternate 3:
 1. ALT-3 C9.5 PB - Phase B Alternate 3 - Parking Lot Area Irrigation Construction Plan
 - b. See attached revised sheet.
3. C17.0 PB - Heat Pump Supply & Return Line Details
 - a. CHANGE: Building Wall Penetration Detail
 1. Change the detail note "Hydrostatic pipe wall closure - 'Link Seal' or equal" to read as "Hydrostatic pipe wall closure with 316 stainless steel bolts and nuts - 'Link Seal' or equal per manufacturers specifications."
 - b. DELETE: Butterfly Valve Detail
 - c. See attached revised sheet.
4. C21.2 PB - Vault Details (Typical Vault Details)
 - a. Vault General Notes:
 1. DELETE "The cast iron manhole ring and cover shall be set in a bed of mortar, and carefully adjusted to proposed grade."
 2. DELETE "Each vault shall include a cast iron cover and frame."
 3. DELETE "Casting shall conform to the requirements of specifications for gray iron casting in accordance with A.S.T.M. A-48-83, Class 35B."
 4. DELETE "Casting shall be furnished with machined horizontal bearing surfaces."
 5. DELETE "Casting shall be rated 'Heavy Duty' suitable for H-20 traffic loading."
 - b. Vault Pipe Sleeve Detail
 1. CHANGE the detail note "Hydrostatic pipe wall closure - 'Link Seal' or equal" to read as "Hydrostatic pipe wall closure with 316 stainless steel pressure plates and 316 stainless steel bolts and nuts - 'Link Seal' or equal. Install per manufacturers specifications"
 - c. DELETE: Vault Manhole Frame & Cover Detail
 - d. See attached revised sheet.
5. S1.0 PA Foundation Plan
 - a. Modified size of mechanical equipment pad and removal of equipment pads that were incorrectly placed.
 - b. See attached revised sheet.
6. G1.3 P1-5 General Protection Details
 - a. General Protection Plan Note "w" and Detail 17 note "Exterior grade plywood Paint Exterior side where... "are associated, as indicated.
7. AG4.2 P1-4, AG4.3 P1-4, AG4.4 P1-4:
 - a. Clarification: General Typical Room Note "c"
 1. This note indicates that it is not the intent for the entire room, entire wall or entire

ceiling to be restored or painted unless called out as required in the referenced specification.

b. ADD: General Typical Room Note "c"

1. Add to the note, "Refer to spec section 00 31 27 - Paint Stripping and the associated drawings within this spec".

END OF ADDENDUM

DOCUMENT 001113 - ADVERTISEMENT FOR BIDS

1.1 PROJECT INFORMATION

- A. Notice to Bidders: Prequalified bidders may submit bids for project as described in this Document. Submit bids according to the Instructions to Bidders.
 - 1. Regulatory Requirements: laws and statutes of the State of Nebraska and the State of Nebraska Procurement Manual, current edition, shall govern submittal, opening, and award of bids.
- B. Project Identification: State of Nebraska State Capitol HVAC Replacement and Window Restoration Project.
 - 1. Project Location: 1445 K Street, Lincoln, Nebraska.
- C. Owner: State of Nebraska, Lincoln, Nebraska.
 - 1. Owner's Representative: Robert Ripley.
- D. Architect: BVH Architecture, Lincoln, Nebraska.
- E. Project Description: Project consists of Phase A - Electrical Power Infrastructure Upgrades; Phase B - Remote geothermal wellfield, geothermal header piping, civil and site utilities, deep foundations for future parking structure and the construction of a surface parking lot over the geothermal wellfield; Phase 1 - Architectural, structural, HVAC, electrical, fire suppression/alarm and window restoration at the basement, 1st, 2nd, 3rd floors at the southwest quadrant of the Capitol.
 - 1. Sensitive Building Information: In 2015, the Office of the Capitol Commission established the "Office of the Capitol Commission Policy and Procedure for Security of Drawings Documents containing Sensitive Building Information". This policy was created to protect the safety and security of the people who work and are doing business in the building, as well as the preservation of the building as an important American architectural, historical and cultural landmark. Construction documents are considered SBI and all parties wishing to receive these documents for the purposes of bidding shall complete and return to OCC a signed copy of the "Office of the Capitol Commission Sensitive Building Information (SBI) Drawings Documents Policy Acknowledgement Form" for each set of documents issued. See Section 006000 "Project Forms" for sample copies of applicable forms.
 - 2. All Bidders including Pre-Qualified General Contractors and Sub-Contractors are required to complete the Sensitive Building Information (SBI) Capitol Drawings & Documents Policy Acknowledgement Form before bidding documents may be obtained. This document may be obtained by the Office of the Capitol Commission, BVH Architecture or A & D Technical Supply.
 - a. The perspective bidder (anyone wishing to review or obtain bidding documents) shall submit signed SBI Acknowledgement Form and email or mail hardcopy to (OCC). A & D Technical Supply to obtain or view documents.
 - b. Once a bidder submits signed form to A & D, they will transmit signed form to Matt Hansen at OCC. A & D will then distribute bidding documents after applicable fees and deposits are paid.
 - c. A & D will maintain an Approved Planholders List identifying who has properly submitted SBI Acknowledgement Forms and obtained bidding documents. A & D

- will distribute the planholders list to only those on the approved list as well as any addendum. The list will be made available to the Owner and Architect.
- d. After bidding-unsuccessful bidders will be required to return all documents to A & D. Deposits will be returned if all requirements are met. Bidding documents will be required to be returned whether or not deposit is returned. Date and time of document return will be tracked and supplied to the State of Nebraska.
3. Construction Phase. The General Contractor (GC) is responsible for obtaining SBI Acknowledgment Forms from all sub-contractors, suppliers and service providers prior to execution of their sub-contracts (unless forms have been previously submitted).
 - a. The GC shall maintain a list of their subcontractors and status of SBI Acknowledgment Form submission. GC shall provide a copy to Matt Hansen at OCC.
 - b. The status of the list shall be reviewed at every progress meeting noting any changes to the list.
 - c. GC shall submit final list along with returning all hardcopy sets of bidding documents per the SBI policy before final payment will be authorized.
 - 1) Additional documents include all addendum and any additional documentation issued during the project containing SBI as defined by the policy document contained herein.
 4. Admonition
 - a. The United States Department of the Interior has recognized the Nebraska State Capitol as a registered National Historic Landmark (NHL) possessing exceptional architectural, historic and cultural value for our nation. Original building and site details, finishes and furnishings are of the highest quality available, both in terms of material and craftsmanship. It is the mission of the Office of the Capitol Commission to insure that the work performed under construction and service contracts be of a quality equal or superior to the original construction. Only qualified, experienced contractors/craftsmen who recognize the exceptional value of this landmark and can perform to the highest standards will be employed.

F. Construction Contract: Bids will be received for the following Work:

1. General Contract (all trades).

1.2 BID SUBMITTAL AND OPENING

- A. Owner will receive sealed lump sum bids until the bid time and date at the location given below. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Owner, and delivered as follows:
 1. Bid Date: 24 May, 2018.
 2. Bid Time: 2:00 p.m. , local time for the following:
 - a. Section 004113 "Bid Form", Section 004113.1 "Bid Form - Ductwork Cleaning", Section 004321 "Allowances Form".
 3. Bid Time: 2:30 p.m., local time for the following:
 - a. Section 004322 "Unit Prices Form", Section 004322.1 "Unit Prices Form Mechanical" and Section 004323 "Alternates Form".
 4. Hand-Delivered Bid Location: Office of the Capitol Commission , 7th Floor of Nebraska State Capitol, 1445 K Street, Lincoln, NE 68509 .

5. Mailed Bid Location: Office of the Capitol Commission, P.O. Box 94696, Lincoln, NE 68509-4696

- B. Bids will be thereafter publicly opened and read aloud at 2:30 p.m. local time at the Capitol Hearing Room 1507.
- C. Faxed or emailed bids are not allowed.

1.3 BID SECURITY

- A. Bid security shall be submitted with each bid in the amount of 5 percent of the bid amount. No bids may be withdrawn for a period of 45 days after opening of bids. Owner reserves the right to reject any and all bids and to waive informalities and irregularities. Bid security may be in the form of a certified or cashier's check or Bid Bond.
- B. The character and amount of security to be submitted by the contractor for the performance of the contract is stated in the proposed contract documents.
- C. The bid deposit of all except the three (3) lowest bidders may be returned within three (3) days after the opening of bids. The bid deposit of the three lowest bidders may be returned within 48 hours after the executed contract and required bonds have been finally approved by the OCC.

1.4 PREBID MEETING

- A. Prebid Meeting Schedule. All meetings will be held at the site. General Contractors are encouraged to contact additional sub-contractors they wish to tour the building. Bids will not be accepted from bidders not attending the Pre-Bid Meetings.

1. Mandatory Meeting Day 1-General Project Information and Orientation Meeting.

- a. Meeting: Time - 1 May, 2018. 9:00 am local time. Meeting will be held in Room 1510.
 - 1) 9:00-11:00 AM—Orientation meeting and general information.
 - 2) 11:00 AM-1:00 PM—break
 - 3) 1:00 PM—2:45 PM—Tour Session #1 (concurrent tours for the following disciplines). Tour will begin in Room 1510.
 - a) Architectural / windows /site work (tours origination-verify w/ OCC)
 - b) HVAC systems
 - c) Electrical systems
 - d) Fire Protection/Fire Alarm
 - 4) 3:00 PM—4:45 PM—Tour Session #2 (concurrent tours for the following disciplines/areas of work). Tour will begin in Room 1510.
 - a) Architectural / windows /site work
 - b) HVAC systems
 - c) Electrical systems
 - d) Fire Protection/Fire Alarm

2. Meeting Day 2 Tour Session #3

- a. Meeting Time - 7 May, 2018. 9:00 am local time. Meeting will begin in Room 1510.
 - 1) 9:00 – 10:45 AM—Tour Session #3 (concurrent tours for the following disciplines). Meeting will begin in Room 1510.

- a) Architectural / windows /site work
- b) HVAC systems
- c) Electrical systems
- d) Fire Protection/Fire Alarm

3. The following sessions are Mandatory for all pre-qualified bidders:

- a. General Orientation Session #1
- b. Minimum of one of the Tour Sessions times will also be mandatory
- c. Other subcontractors outside of those prequalified are also encouraged to tour the building for information on work that they are interested in bidding on.

- B. Minutes: Architect will record and distribute meeting minutes to attendees and others known by the issuing office to have received a complete set of Procurement and Contracting Documents. Minutes of meeting are issued as Available Information and do not constitute a modification to the Procurement and Contracting Documents. Modifications to the Procurement and Contracting Documents are issued by written Addendum only.
- C. List of Planholders: Minutes will include list of planholders.
- D. Bidder questions and clarifications: All questions and requests for clarifications shall be due to the design team on or before 5:00 p.m. local time on 11 May, 2018.
- E. Final Addendum: The final addendum will be issued at 5:00 p.m. local time on 16 May, 2018.

1.5 DOCUMENTS

- A. Printed Procurement and Contracting Documents: Obtain by contacting A D Technical Supply, Lincoln, NE at 402-474-5454. Documents will be provided to bidders only in complete sets of documents.
 - 1. Deposit: \$600.00 made payable to the Owner.
 - 2. Shipping: Additional non-refundable shipping charges will apply if bidder is requesting mailed/shipped bidding documents. Cost for shipping can be obtained by contacting A & D Technical Supply.
- B. Viewing Procurement and Contracting Documents: Examine after 23 April, 2018, at the locations below:
 - 1. Office of the Capitol Commission, 7th Floor of State Capitol 1445 K Street Lincoln, NE 68509 Phone: 402-471-0448
 - 2. BVH Architecture, 440 N 8th Street, Ste 100 Lincoln, NE 68508 Phone: 402-475-4551

1.6 TIME OF COMPLETION

- A. Successful bidder shall begin the Work on receipt of the Notice to Proceed and shall complete the Work within the Contract Time. See Section 013200 "Construction Progress Documentation" for construction schedule for Phases A, B and 1.

1.7 BIDDER'S QUALIFICATIONS

- A. Bidders must have been prequalified by Owner.
- B. The following list of bidders have been pre-qualified for bidding this project.

- 1. General Contractors:

- a. Boyd Jones Construction.
 - b. Hausmann Construction.
 - c. Kingery Construction Company.
 - d. Sampson Construction.
- 2. Window Restoration Sub-Contractors:
 - a. Pishny Restoration Services.
 - b. Re-View Windows, Inc.
- 3. Mechanical Sub-Contractors:
 - a. H & S Plumbing and Heating.
 - b. IES Commercial Inc., d.b.a. Shanahan Mechanical and Electrical.
 - c. Midlands Mechanical, Inc.
 - d. The Waldinger Corporation.
- 4. Electrical Sub-Contractors:
 - a. ABC Electric Company, inc.
 - b. Capitol City Electric, Inc.
 - c. Gregg Electric Company.
 - d. IES Commercial Inc., d.b.a. Shanahan Mechanical and Electrical.
 - e. Kidwell.
 - f. Willmar Electric Service.
- 5. Fire Protection Sub-Contractors:
 - a. Continental Fire Sprinkler Company.
 - b. NIFCO Mechanical Systems.
 - c. Summit Companies.
- 6. Fire Alarm Sub-Contractors:
 - a. General Fire and Safety.
 - b. Johnson Controls, Inc.
- 7. Hazardous Materials Services:
 - a. New Horizons Environmental LLC
 - b. Earth Services & Abatement
 - c. Bockmann Inc.
 - d. Great Plains Asbestos Control, Inc.
- 8. VRF Equipment Manufacturer:
 - a. Mitsubishi as represented by Force Equipment Company.
- C. Coordinate also with Section 001153 "Request for Qualifications" for additional sub-contractors who will need to submit qualifications for bidding.
- D. Bidders must be properly licensed under the laws governing their respective trades and be able to obtain insurance and bonds required for the Work. A Performance Bond, separate Labor and Material Payment Bond, and Insurance in a form acceptable to Owner will be required of the successful Bidder.

- E. All parties (general contractors and any sub-contractors) wishing to receive copies of the construction documents for this project for bidding purposes shall complete and return to OCC a copy of the "Office of the Capitol Commission Sensitive Building Information Capitol Drawings and Documents Policy Acknowledgement Form". A copy of this form was mailed to qualified general contractors along with the Letter of Interest. Additional copies of the SBI Policy Acknowledgement Form can be obtained upon request from the OCC.
- F. The State of Nebraska, Office of the Capitol Commission, reserves the right to reject any or all bids and re-advertise for Bids; and further reserves the right to waive any informality or irregularity.

1.8 NOTIFICATION

- A. This Advertisement for Bids document is issued by BVH Architecture.

END OF DOCUMENT 001113

DOCUMENT 004113 - BID FORM - STIPULATED SUM (SINGLE-PRIME CONTRACT)

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: State of Nebraska State Capitol HVAC Replacement and Window Restoration Project.
- C. Project Location: 1445 K Street, Lincoln, Nebraska.
- D. Owner: State of Nebraska.
- E. Owner Project Number: 201405.
- F. Architect: BVH Architecture.
- G. Architect Project Number: L14077.

1.2 CERTIFICATIONS AND BASE BID

A. ADMONITION

- 1. The United States Department of the Interior has recognized the Nebraska State Capitol as a registered National Historic Landmark (NHL) possessing exceptional architectural, historic and cultural value for our nation. Original building and site details, finishes and furnishings are of the highest quality available, both in terms of material and craftsmanship. It is the mission of the Office of the Capitol Commission to insure that the work performed under construction and service contracts be of a quality equal or superior to the original construction. Only qualified, experienced contractors/craftsmen who recognize the exceptional value of this landmark and can perform to the highest standards will be employed.

- B. The Contractor shall provide complete and separate stipulated sums for each different phase including Phase 1, Phase A and Phase B. It is Owner's intent that one General Contractor provide work for all phases indicated.

- C. Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by BVH Architecture and Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:

- 1. Phase 1 - _____ Dollars
(\$_____).
- 2. Phase A - _____ Dollars
(\$_____).
- 3. Phase B - _____ Dollars
(\$_____).
- 4. The above amounts may be modified by amounts indicated by the Bidder on the attached Document 004322 "Unit Prices Form" and Document 004323 "Alternates Form."
- 5. Pre-Qualified Subcontractors. Identify the pre-qualified subcontractors included within your proposal, from the list indicated in Section 001113, on the lines below.
 - a. Window Restoration: _____
 - b. Mechanical: _____

- c. Electrical: _____
- d. Fire Protection: _____
- e. Fire Alarm: _____
- f. Hazardous Material: _____

1.3 BID GUARANTEE

- A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 days after a written Notice of Award, if offered within 45 days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cashier's check, certified check, or bid bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above. One Bid Bond may be submitted to include the total of all three Phase 1, Phase A and Phase B amounts.

- 1. Phase 1 - _____ Dollars
(\$ _____).
- 2. Phase A - _____ Dollars
(\$ _____).
- 3. Phase B - _____ Dollars
(\$ _____).

- B. In the event Owner does not offer Notice of Award within the time limits stated above, Owner will return to the undersigned the cashier's check, certified check, or bid bond.
- C. The undersigned states that he is complying with, and will continue to comply with, fair labor standards in the pursuit of his business and in the execution of the contract on which he is bidding.
- D. The undersigned acknowledges having reviewed provisions outlined for exemption of payment of sales taxes to the State of Nebraska and also understands the requirements for registration of any and all nonresident contractors and subcontractors with the Nebraska Department of Revenue.
- E. In submitting this bid, it is understood that the right is reserved by the Office of the Capitol Commission to reject any or all bids and to waive informalities, and it is further agreed that this bid may not be withdrawn during the period of forty-five (45) days following the closing time for receipt of the bids.

1.4 TIME OF COMPLETION

- A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect, and shall fully complete the Work within the time-frames as indicated on the Phase A, B and 1 Construction Schedule located in Section 013200.

1.5 ACKNOWLEDGEMENT OF ADDENDA

- A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

- 1. Addendum No. 1, dated _____.
- 2. Addendum No. 2, dated _____.

3. Addendum No. 3, dated _____.
4. Addendum No. 4, dated _____.
5. Addendum No. 5, dated _____.

1.6 BID SUPPLEMENTS

A. The following supplements are a part of this Bid Form and are attached hereto.

1. Bid Form Supplement - Alternates.
2. Bid Form Supplement - Unit Prices.
3. Bid Form Supplement - Allowances.
4. Bid Form Supplement - Bid Bond Form (AIA Document A310).
5. Other items as indicated in Section 004373 "Bid Submittal Checklist" as well as any other item identified within this Project Manual.

1.7 CONTRACTOR'S LICENSE

A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in State of Nebraska, and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

1.8 SUBMISSION OF BID

- A. Respectfully submitted this ____ day of _____, 2018.
- B. Submitted By: _____ (Name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).
- F. Witness By: _____ (Handwritten signature).
- G. Attest: _____ (Handwritten signature).
- H. By: _____ (Type or print name).
- I. Title: _____ (Corporate Secretary or Assistant Secretary).
- J. Street Address: _____.
- K. City, State, Zip: _____.
- L. Phone: _____.
- M. License No.: _____.
- N. Federal ID No.: _____ (Affix Corporate Seal Here).

END OF DOCUMENT 004113

DOCUMENT 004113.1 - BID FORM – DUCTWORK CLEANING

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: State of Nebraska State Capitol HVAC Replacement and Window Restoration Project.
- C. Project Location: 1445 K Street, Lincoln, Nebraska.
- D. Owner: State of Nebraska.
- E. Owner Project Number: 201405.
- F. Architect: BVH Architecture.
- G. Architect Project Number: L14077.

1.2 CERTIFICATIONS AND BASE BID

A. ADMONITION

- 1. The United States Department of the Interior has recognized the Nebraska State Capitol as a registered National Historic Landmark (NHL) possessing exceptional architectural, historic and cultural value for our nation. Original building and site details, finishes and furnishings are of the highest quality available, both in terms of material and craftsmanship. It is the mission of the Office of the Capitol Commission to insure that the work performed under construction and service contracts be of a quality equal or superior to the original construction. Only qualified, experienced contractors/craftsmen who recognize the exceptional value of this landmark and can perform to the highest standards will be employed.
- B. The Ductwork Cleaning contractor shall provide complete stipulated sum for Phase 1.
- C. The duct cleaning scope shall be as shown on M drawing sheets and as contained in Project Manual Section 230130.51.
- D. The duct cleaning contractor shall coordinate with and be under the direction of the project's Mechanical Contractor.
- E. The OCC will contract directly with the Duct Cleaning company for this work.
- F. The Duct Cleaning company shall submit their bid using the new bid form. They shall submit this directly to the owner. This form shall be due at same time as all other bids.
- G. This bid shall be due at same location and time as all other bids.
- H. Base Bid: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by BVH Architecture and Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:

1. Phase 1 - _____ Dollars
(\$_____).

1.3 BID GUARANTEE

- A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 days after a written Notice of Award, if offered within 45 days

BVH ARCHITECTURE
BVH# L14077
OCC# 201405

BID FORM – DUCTWORK
CLEANING

004113.1 - 1

after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cashier's check, certified check, or bid bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above.

1. Phase 1 - _____ Dollars
(\$_____).

- B. In the event Owner does not offer Notice of Award within the time limits stated above, Owner will return to the undersigned the cashier's check, certified check, or bid bond.
- C. The undersigned states that he is complying with, and will continue to comply with, fair labor standards in the pursuit of his business and in the execution of the contract on which he is bidding.
- D. The undersigned acknowledges having reviewed provisions outlined for exemption of payment of sales taxes to the State of Nebraska and also understands the requirements for registration of any and all nonresident contractors and subcontractors with the Nebraska Department of Revenue.
- E. In submitting this bid, it is understood that the right is reserved by the Office of the Capitol Commission to reject any or all bids and to waive informalities, and it is further agreed that this bid may not be withdrawn during the period of forty-five (45) days following the closing time for receipt of the bids.

1.4 TIME OF COMPLETION

- A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect, and shall fully complete the Work within the time-frame as indicated on the Phase 1 Construction Schedule located in Section 013200.

1.5 ACKNOWLEDGEMENT OF ADDENDA

- A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:
 - 1. Addendum No. 1, dated _____.
 - 2. Addendum No. 2, dated _____.
 - 3. Addendum No. 3, dated _____.
 - 4. Addendum No. 4, dated _____.
 - 5. Addendum No. 5, dated _____.

1.6 BID SUPPLEMENTS

- A. The following supplements are a part of this Bid Form and are attached hereto.
 - 1. Bid Form Supplement - Bid Bond Form (AIA Document A310).
 - 2. Other items as indicated in Section 004373 "Bid Submittal Checklist" as well as any other item identified within this Project Manual.

1.7 CONTRACTOR'S LICENSE

- A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in State of Nebraska, and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

1.8 SUBMISSION OF BID

- A. Respectfully submitted this ____ day of _____, 2018.
- B. Submitted By: _____ (Name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).
- F. Witness By: _____ (Handwritten signature).
- G. Attest: _____ (Handwritten signature).
- H. By: _____ (Type or print name).
- I. Title: _____ (Corporate Secretary or Assistant Secretary).
- J. Street Address: _____.
- K. City, State, Zip: _____.
- L. Phone: _____.
- M. License No.: _____.
- N. Federal ID No.: _____ (Affix Corporate Seal Here).

END OF DOCUMENT 004113

DOCUMENT 004322 - UNIT PRICES FORM

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: State of Nebraska State Capitol HVAC Replacement and Window Restoration Project.
- C. Project Location: 1445 K Street, Lincoln, Nebraska.
- D. Owner: State of Nebraska.
- E. Owner Project Number: 201405.
- F. Architect: BVH Architecture.
- G. Architect Project Number: L14077.

1.2 BID FORM SUPPLEMENT

A. ADMONITION

- 1. The United States Department of the Interior has recognized the Nebraska State Capitol as a registered National Historic Landmark (NHL) possessing exceptional architectural, historic and cultural value for our nation. Original building and site details, finishes and furnishings are of the highest quality available, both in terms of material and craftsmanship. It is the mission of the Office of the Capitol Commission to insure that the work performed under construction and service contracts be of a quality equal or superior to the original construction. Only qualified, experienced contractors/craftsmen who recognize the exceptional value of this landmark and can perform to the highest standards will be employed.
- B. This form is required to be attached to the Bid Form.
- C. The undersigned Bidder proposes the amounts below be added to or deducted from the Contract Sum on performance and measurement of the individual items of Work and for adjustment of the quantity given in the Unit-Price Allowance for the actual measurement of individual items of the Work.
- D. If the unit price does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

1.3 UNIT PRICES

- A. Refer to Section 012200 "Unit Prices" for additional information.
- B. Unit-Price No. A-1: Ceiling Patching.
 - 1. _____ Dollars (\$ _____) per unit.
- C. Unit-Price No. A-2: Three-Coat Plaster system on masonry walls.
 - 1. _____ Dollars (\$ _____) per unit.
- D. Unit-Price No. A-3: Plaster Crack Repair.
 - 1. _____ Dollars (\$ _____) per unit.
- E. Unit-Price No. A-4: Finish Coat Plaster Repair.

1. _____ Dollars (\$ _____) per unit.
- F. Unit-Price No. A-5: New Slate Base.
1. _____ Dollars (\$ _____) per unit.
- G. Unit-Price No. A-6: Wall infill with Structural Clay Tile (SCT).
1. _____ Dollars (\$ _____) per unit.
- H. Unit-Price No. A-7: Wall infill with brick.
1. _____ Dollars (\$ _____) per unit.
- I. Unit-Price No. A-8: Wall infill with new 4 inch CMU.
1. _____ Dollars (\$ _____) per unit.
- J. Unit-Price No. A-9: Carpet adhesive removal at existing carpeted areas.
1. _____ Dollars (\$ _____) per unit.
- K. Unit-Price No. A-10: Fireproofing patches at existing steel beams.
1. _____ Dollars (\$ _____) per unit.
- L. Unit Price No. B-1: Sheet Piling.
1. _____ Dollars (\$ _____) per unit.

1.4 SUBMISSION OF BID SUPPLEMENT

- A. Respectfully submitted this ____ day of _____, 20____.
- B. Submitted By: _____ (insert name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).

END OF DOCUMENT 004322

DOCUMENT 004393 - BID SUBMITTAL CHECKLIST

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: State of Nebraska State Capitol HVAC Replacement and Window Restoration Project.
- C. Project Location: 1445 K Street, Lincoln, Nebraska.
- D. Owner: State of Nebraska.
- E. Owner Project Number: 201405.
- F. Architect: BVH Architecture.
- G. Architect Project Number: L14077.

1.2 BIDDER'S CHECKLIST

A. ADMONITION

- 1. The United States Department of the Interior has recognized the Nebraska State Capitol as a registered National Historic Landmark (NHL) possessing exceptional architectural, historic and cultural value for our nation. Original building and site details, finishes and furnishings are of the highest quality available, both in terms of material and craftsmanship. It is the mission of the Office of the Capitol Commission to insure that the work performed under construction and service contracts be of a quality equal or superior to the original construction. Only qualified, experienced contractors/craftsmen who recognize the exceptional value of this landmark and can perform to the highest standards will be employed.
- B. In an effort to assist the Bidder in properly completing all documentation required, the following checklist is provided for the Bidder's convenience. The Bidder is solely responsible for verifying compliance with bid submittal requirements.
- C. Attach this completed checklist to the outside of the Submittal envelope.
 - 1. Used the Bid Form provided in the Project Manual.
 - 2. Prepared the Bid Form as required by the Instructions to Bidders.
 - 3. Indicated on the Bid Form the Addenda received.
 - 4. Attached to the Bid Form: Bid Supplement Form - Allowances.
 - 5. Attached to the Bid Form: Bid Supplement Form - Unit Prices.
 - 6. Attached to the Bid Form: Bid Supplement Form - Alternates.
 - 7. Attached to the Bid Form: Bid Bond OR a certified check for the amount required.
 - 8. Bid envelope shows name and address of the Bidder.
 - 9. Bid envelope shows the Bidder's Contractor's License Number.
 - 10. Bid envelope shows name of Project being bid.
 - 11. Bid envelope shows time and day of Bid Opening.

END OF DOCUMENT 004393

This addendum is hereby made a part of the contract documents to the same extent as though it were originally included therein. Specifications and drawings shall be considered modified or revised as hereinafter described. Revisions to the drawings are referenced by the drawing number.

Clarification Items

Electrical Clarification Items – Phases A and 1:

- 5CI1. At the end of Phase 1, there will be two fire alarm systems; the existing system and the new system. Do these two systems need to be tied together to work as one system? What is to be done with the two voice systems, and are they to be the same message and tones?

Response: Yes. The two systems will need to work together. To avoid confusion for building occupants, voice messages and tones from both systems need to be the same.

- 5CI2. With the removal of the existing devices, the existing fire/voice panels will have to have constant programming changes to remove those devices and loops. Is it to be considered part of this project to do the programming changes and clear the troubles from the existing fire alarm system?

Response: Any required programming changes are to be included in the project.

- 5CI3. Nothing is mentioned about the Fire Workstation in the Security/Comm. Office. Is that to be replaced with a new one? Also, do the existing points need to be removed from the work station when they are removed from the existing fire panel program?

Response: The existing fire graphic workstation in the Security Office 1405 will remain in place serving remaining original zones and devices through phase 5. A new U.L. Listed fire graphic workstation shall be provided to serve the new zones and devices. The workstation shall include, but not be limited to: computer, monitor, keyboard, mouse, software, programming, training, connecting cables, and all associated appurtenances required to provide a complete and functional system. The new workstation shall have capacity for expansion to accommodate all of the future phases as they are added to the system. Existing points shall be removed from the work station when they are removed from the existing fire panel program.

- 5CI4. In Demolition General Notes on Sheet E0.0, 14, it says to remove existing fire alarm devices and wiring. Reuse conduit and boxes where possible for installation of new mass notification system. Remove conduit which is not reused. Is this correct? It contradicts Section 284600, Paragraph 1.2B and would not make Paragraph 2.3A possible (i.e., You cannot maintain the existing system until the new system has been tested and accepted if you are removing the wire and devices to reuse the conduit).

Response: The southwest quadrant will be vacated during Phase 1 for construction. The fire alarm system in that area can be removed from service, thereby allowing for removal of devices and wiring before installation of new devices and wiring. The intent for 284600, Paragraph 1.2B, is to maintain fire alarm coverage in remaining areas of the building not included in this construction phase.

5CI5. In Paragraph 2.5F, Manual Pull Stations, do you want a metal, single-action pull station with glass rods?

Response: Yes. New metal pull stations shall be similar to Edwards SIGA 270 Series.

5CI6. Are Sections 284600 and 284601 to be bid as one system?

Response: Yes.

5CI7. On Sheet ED1.4 #3, it shows the FACP-B in bold. Is this just for showing the location?

Response: Yes, just for showing the location. FACP-B shall remain in place and serve its intended functions until such time that it no longer is needed and can then be removed (Phase 5).

5CI8. Where are the new FACP's and voice panels to be located?

Response: New FACP and Voice Panels that serve the same general zones/areas as current panel 'B,' shall be located in the same vicinity as existing panel 'B', on Mezzanine 1, Southwest quadrant. See Detail 3 on Sheet E3.4 P1. New FACP and voice panels that serve the same general zones/areas as current panel 'A,' which are currently located in the Security Office 1405, shall be located in the basement in Storage Room 36. See reissued Sheet E3.0.1.

Changes to the Project Manual

Mechanical Specification Items – Phases A and 1:

5MS1. Section 221005 – Plumbing Piping

1. Page 221005 – 6, Paragraph 2.2A: Modify "Schedule 80" to be "Schedule 40."
2. Page 221005 – 6, Article 2.2: Modify to read: "SANITARY AND VENT AND STORM SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING."
3. Page 221005 – 6, Paragraph 2.3A: Modify "Schedule 80" to be "Schedule 40."
4. Page 221005 – 7: Delete Paragraph 2.6A.
5. Page 221005 – 11: Add the following:

"2.10 STORM SEWER PIPING ABOVE GRADE

A. Schedule 40 galvanized steel pipe.

1. Fittings: Victaulic Roust-A-Bout couplings, Style 99 or approved equal, for connecting to existing galvanized steel piping."

5MS2. Section 220719 – Plumbing Piping Insulation

1. Page 220719 – 7: Delete Paragraph 3.2C.

5MS3. Section 230516 – Expansion Fittings and Loops for HVAC Piping

1. Page 230516 – 2: Add Subparagraph 2.1.A.7 as follows:
“7. Keflex.”
2. Page 230516 – 2: Add Subparagraph 2.2.A.7 as follows:
“7. Keflex.”
3. Page 23056 – 3: Add Subparagraph 2.3.A.4 as follows:
“4. Keflex.”

5MS4. Section 230548 – Vibration and Seismic Controls for HVAC Piping and Equipment

1. Page 230548 – 2: Delete Article 2.3 in its entirety.

5MS5. Section 230593 – Testing, Adjusting, and Balancing for HVAC

1. Page 230593 – 14: Delete Article 3.13 in its entirety.
2. Page 230593 – 15: Delete Article 3.14 in its entirety.
3. Page 230593 – 17: Delete Article 3.15 in its entirety.

5MS6. Section 230713 – Duct Insulation

1. Page 230713 – 8: Delete Subparagraph 3.5B.4.b.
2. Page 230713 – 8: Delete Subparagraph 3.5B.4.c.
3. Page 230713 – 8: Add Subparagraph 3.5.B.5 as follows:
“5. Conditioned Outside Air:
a. Exposed or concealed shall be the following:
1) Glass-Fiber Blanket: 1-1/2” thick and 1.5-lb/cu. ft. nominal density.”
4. Page 230713 – 8: Modify Subparagraph 3.5.C.2 as follows:
“2. Ducts and Plenums, in mechanical rooms and in second floor attic spaces.”
5. Page 230713 – 8: Delete Subparagraph 3.5.C.2.b.

5MS7. Section 230719 – HVAC Piping Insulation

1. Page 230719 – 11: Modify Subparagraph 3.5.B.6.a.1 as follows:
“1) Flexible Elastomeric: 3/4 inches thick.”

2. Page 230719 – 11: Modify Subparagraph 3.5.D.2 as follows:
 - “2. Piping: For all piping in mechanical rooms except for refrigerant piping, all exposed piping in public spaces, and for all piping in the second floor attic spaces except for refrigerant piping.”
3. Page 230719 – 11: Delete Subparagraph 3.5.D.2.b.

5MS8. Section 230913.13 – Instrumentation and Control Devices for HVAC

1. Page 230913.13 – 8: Delete Subparagraph 2.7B.10.
2. Page 230913.13 – 20: Delete Subparagraphs 3.2I.1 through 3.2I.4, and replace with the following:
 - “1. For all modulating control valves except where noted otherwise.
 2. For 2-position control valves only when specifically indicated to be pressure independent control valves.”

5MS9. Section 230923 – Direct-Digital Control System for HVAC

1. Page 230923 – 6: Add Paragraph 2.1F as follows:

“F. Automated Logic.”

5MS10. Section 230993 – Sequence of Operations for HVAC Controls

1. Replace this section with the attached updated Section 230993.

5MS11. Section 232114 – Hydronic Specialties

1. Page 232114 – 9: Add Subparagraph 2.16.A.6 as follows:

“6. General Treatment Products.”

5MS12. Section 232123 – Hydronic Pumps

1. Page 232123 – 1: Delete Paragraph 1.5C.
2. Page 232123 – 2: Delete Paragraphs 2.1G and 2.1N.
3. Page 232123 – 3: Modify Subparagraph 2.2.A.1 as follows:
 - “1. Grundfos Pumps Corporation.”
4. Page 232123 – 3: Delete Paragraph 2.2E.

5. Page 232123 – 3: Modify Subparagraph 2.2.F.3 as follows:

“3. The suction and discharge manifolds material shall be either 316 stainless steel or carbon steel.”
6. Page 232123 – 7: Modify Paragraph 2.4B as follows:

“B. Type: Factory assembled and tested, centrifugal, overhung-impeller, separately coupled, radially split casing, end-suction pump designed for base mounting with pump and motor shafts horizontal, for 175 psi maximum working pressure.”

5MS13. Section 232500 – HVAC Water Treatment

1. Page 232500 – 1: Paragraph 1.4B: Insert “five” into the blank.
2. Page 232500 – 3: Delete Subparagraph 2.1.A.4.
3. Page 232500 – 4: Delete Paragraph 2.3C.
4. Page 232500 – 6: Delete Paragraph 3.2E.
5. Page 232500 – 6: Delete Article 3.5 in its entirety.
6. Page 232500 – 5: Add Subparagraph 2.9.J.2 as follows:

“2. General Treatment Products.”

5MS14. Section 233100 – HVAC Ducts and Casings

1. Page 233100 – 9: Add Subparagraph 2.5.E.4.e and f as follows:

“e. CaptiveAire.
f. Schebler.”

5MS15. Section 233423 – HVAC Power Ventilators

1. Page 233423 – 4: Modify Article 2.4 to read: “**INLINE CENTRIFUGAL FANS (EF-3SW1 and EF-3SW2)**.”
2. Page 233423 – 4: Add Article 2.5 as follows:

“2.5 **INLINE CENTRIFUGAL FANS (EF-3SW3 and EF-3SW4)**

 - A. Description: In-line, direct-driven centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories.
 - B. Housing: All aluminum construction with aluminum inlet and outlet duct flanges, and support brackets for hanging from structure.

- C. Direct-Driven Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing.
- D. Fan Wheels: Aluminum, backward inclined blades welded to aluminum hub.
- E. Accessories:
 - 1. Factory mounted and wired NEMA-1 toggle type disconnect switch.
 - 2. ECM fan motor with speed adjustment dial mounted and wired on exterior of fan housing."

5MS16. Section 233700 – Air Outlets and Inlets

- 1. Page 233700 – 2, Article 2.1: Add the following: "AJ Manufacturing (for lattice face grilles only)."
- 2. Page 233700 – 3: Delete Articles 2.4 and 2.5 in their entirety.
- 3. Page 233700 – 5: Delete Articles 2.6 and 2.7 in their entirety.

5MS17. Section 234000 – HVAC Air Cleaning Devices

- 1. Page 234000 – 4: Add Subparagraph 2.7.A.3 as follows:
 - "3. Bioclimatic."
- 2. Page 234000 – 4: Modify Paragraph 2.7C as follows:
 - "C. MERV 13 filtration efficiency. The filters must be capable of reducing the ventilation airflow rate down to 5 cfm per person for AHU-BNW1 and AHU-BNW2 for assembly and meeting room occupancies using the ASHRAE 62.1 IAQ procedure."

5MS18. Section 235700 – Heat Exchangers for HVAC

- 1. Page 235700 – 2, Paragraph 2.1A.: Add the following:
 - "5. Alstrom."
- 2. Page 235700 – 2: Modify Paragraphs 2.1B, 2.1C, and 2.1D as follows:
 - "B. Tubes: U-tube type with 3/4 inch OD minimum, seamless 18 gauge copper tubes,
 - C. Shell: Carbon steel with threaded or flanged piping connections and necessary tappings, steel saddle and attaching U-bolts.
 - D. Heads: Carbon steel with 304 stainless steel tube sheets, threaded or flanged for piping connections."

3. Page 235700 – 2: Add Paragraph 2.1G as follows:
“G. Design, test, fabricate in accordance with ASME Code.”
4. Page 235700 – 2: Add Paragraph 2.1E as follows:
“E. Design: Heating steam in tubes and heated water in shell.”
5. Page 235700 – 3: Add Subparagraph 2.2.A.5 as follows:
“5. Alstrom.”
6. Page 235700 – 4: Add Subparagraph 2.3.A.10 as follows:
“10. Alstrom.”

5MS19. Section 236429 – Modular Water Chillers

1. Page 236429 – 3: Modify Paragraph 1.7C as follows:
“C. Manufacturer’s Warranty:
 1. Provide minimum ten year warranty to include coverage for materials and labor for the compressors.
 2. Provide minimum five year warranty for materials and labor for all parts except the compressors.”
2. Page 236429 – 7: Add Paragraph 3.2D as follows:
“D. Figure one site visit for startup during peak summer or winter conditions (if possible) and one site visit around the opposite peak summer or winter conditions by factory authorized representatives and technicians for Phase 1 in cooperation with the Owner’s commissioning agent. The non-startup site visit will be to commission the systems to for seasonal conditions and modify parameters and/or control settings to the needs of the system for Phase 1 in cooperation with the Owner’s commissioning agent.”
3. Page 236429 – 7: Add Paragraph 3.3C as follows:
“C. For each of the five phases of construction figure for two site visits (one around peak summer conditions and one around peak winter conditions) by factory authorized representatives and technicians to commission the systems to the expanded flow/system layout and modify parameters and/or control settings to the needs of the system for each phase in cooperation with the Owner’s commissioning agent.”

5MS20. Section 237300 – Packaged Indoor Central Station Air Handling Units

1. Page 237300 – 3, Paragraph 2.2A: Modify “Air Handling Units” to read as “Air Handling Units (AHU-2123 and FCU-6).”
2. Page 237300 – 6: Delete Article 2.8 in its entirety.
3. Page 237300 – 7: Delete Article 2.12 in its entirety.

5MS21. Section 237313 – Modular Central-Station Air-Handling Units

1. Page 237313 – 7: Modify Paragraph 2.5P as follows:

“P. Each fan/motor assembly shall be removable through a minimum 24” wide access door located on the discharge side of the fan array.”
2. Page 237313 – 18: Modify Subparagraph 3.7C.1.a.2 as follows:

“2) Owner Representative.”
3. Page 237313 – 18: Delete Subparagraph 3.7C.1.a.4.
4. Page 237313 – 19: Modify the first sentence of Paragraph 3.7D as follows: “Factory Leak Testing: The unit manufacturer shall provide a witnessed factory leak test on one selected unit. The Owner and Engineer will select the unit to be tested.”

5MS22. Section 238129 – Variable Refrigerant Flow (VRF) HVAC System

1. Page 238129 – 2: Add the following to the end of Paragraph 1.4D as follows: “The Owner’s intends to add variable water flow valves and variable evaporator temperature control for the water source units to the Owner’s VRF equipment purchase contract. The Owner also intends to add low height VRF fan coils, for use at the second floor courtyard side window locations, as manufactured by Williams with stainless steel drain pans, factory mounted disconnects, and ECM fan motors to the Owner’s VRF equipment purchase contract.”
2. Page 238129 – 2: Add Subparagraph 1.4.E.4 as follows:

“4. The contract for the owner purchased VRF equipment does not include the cost of shipping. The mechanical contractor shall include the cost of shipping the VRF equipment from the VRF manufacturer to the site in their bid.”

5MS23. Section 238200 – Convection Heating and Cooling Units

1. Replace this section with the attached updated Section 238200.

5MS24. Section 238300 – Radiant Heating Units

1. Delete this section in its entirety.

Mechanical Specification Items – Phase B:

5MS25. Section 220553 – Identification for Plumbing Piping and Equipment

1. Page 220553 – 1: Delete Article 2.1 in its entirety.
2. Page 220553 – 3: Delete Paragraph 2.5C
3. Page 220553 – 3: Delete Paragraph 2.5E in its entirety.
4. Page 220553 – 3: Delete Article 3.2 in its entirety.
5. Page 220553 – 4: Delete Paragraph 3.3C.
6. Page 220553 – 4: Delete Paragraph 3.3E.
7. Page 220553 – 4: Delete Paragraph 3.3F.
8. Page 220553 – 4: Delete Paragraph 3.4B.
9. Page 220553 – 4: Delete Paragraph 3.4C.
10. Page 220553 – 4: Modify Paragraph 3.5B as follows:
“B. Identify pumps with plastic nameplates.”

5MS26. Section 221005 – Plumbing Piping

1. Page 221005 – 5: Add the following to the end of Article 2.1 as follows: “AND BURIED WITHIN 5 FEET OF BUILDING.”
2. Page 22105 – 6: Delete Article 2.5 in its entirety.

5MS27. Section 223000 – Plumbing Equipment

1. Page 223000 – 2: Delete Article 2.2 in its entirety.
2. Page 223000 – 4: Delete Paragraph 3.1C in its entirety.
3. Page 223000 – 4: Delete Paragraph 3.2C.
4. Page 223000 – 4: Delete Paragraph 3.2D in its entirety.
5. Page 223000 – 5: Delete the word “heaters” in Paragraph 3.4A.

5MS28. Section 230519 – Meters and Gages for HVAC Piping

1. Page 230519 – 4: Modify Subparagraph 3.2.A.1 as follows:
“1. Where shown on drawings or details, 0 to 200 psi.”

2. Page 230519 – 4: Delete Subparagraph 3.2.A.2.
3. Page 230519 – 4: Delete Subparagraphs 3.2.B.1 through 3.2.B.5.
4. Page 230519 – 4: Delete Subparagraphs 3.2.C.1 through 3.2.C.14.
5. Page 230519 – 4: Delete Subparagraphs 3.2.C.1 through 3.2.C.14, and replace with the following:
 - “1. Where shown on drawings or details, 30 to 120 degrees F.”

5MS29. Section 230553 – Identification for HVAC Piping and Equipment

1. Page 230553 – 1: Delete Article 2.1 in its entirety.
2. Page 230553 – 3: Delete Paragraph 2.4B.
3. Page 230553 – 3: Delete Article 2.5 in its entirety.
4. Page 230553 – 3: Delete Paragraph 2.6C.
5. Page 230553 – 4: Delete Paragraph 2.4E.
6. Page 230553 – 4: Delete Article 2.7 in its entirety.
7. Page 230553 – 4: Delete Article 2.8 in its entirety.
8. Page 230553 – 4: Delete Article 3.2 in its entirety.
9. Page 230553 – 5: Delete Paragraph 3.3C.
10. Page 230553 – 5: Delete Paragraph 3.3E.
11. Page 230553 – 5: Delete Paragraph 3.3F.
12. Page 230553 – 5: Delete Paragraph 3.4B.
13. Page 230553 – 6: Delete Paragraph 3.4C.
14. Page 230553 – 6: Modify Paragraph 3.5B as follows:
 - “B. Identify exhaust fans with plastic nameplates.”

5MS30. Section 230719 – HVAC Piping Insulation

1. Page 230719 – 1: Delete Paragraph 1.1B.
2. Page 230719 – 3: Delete Article 2.3 in its entirety.
3. Page 230719 – 5: Delete Paragraph 3.2H.

4. Page 230719 – 7: Modify Subparagraph 3.4.B.1.a.1 as follows:
“1) Flexible Elastomeric, Preformed Pipe, Type I: 1-inch thick.
5. Page 230719 – 7: Modify Subparagraph 3.4.B.1.b.1 as follows:
“1) Flexible Elastomeric, Preformed Pipe, Type I: 1-inch thick.
6. Page 230719 – 7: Delete Subparagraph 3.4.B.2 in its entirety.
7. Page 230719 – 7: Delete Paragraph 3.4C in its entirety.

5MS31. Section 233423 – HVAC Power Ventilators

1. Page 233423: Delete Article 2.4 in its entirety, and replace with the following:
“2.4 IN-LINE CENTRIFUGAL FANS

F. Description: In-line, direct-driven centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories.

G. Housing: All aluminum construction with aluminum outlet duct flange and support brackets for hanging from structure.

H. Direct-Driven Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing.

I. Fan Wheels: Aluminum, backward inclined blades welded to aluminum hub.

J. Accessories:
 1. Factory mounted and wired NEMA-4X disconnect switch.
 2. ECM fan motor with speed adjustment dial mounted and wired on exterior of fan housing.”

Electrical Specification Items – Phases A and 1:

5ES1. Section 260400 – Common Requirements for Electrical

1. Page 260400 – 5: Delete Paragraph 1.13A in its entirety. Requirements for Shop Drawings, Product Data and Samples are covered in Section 013300 – “Submittal Procedures.”
2. Page 260400 – 5: Delete Paragraph 1.13C in its entirety. Requirements for Operation and Maintenance Manuals are covered in section 017823 – “Operation and Maintenance Data.”

Changes to the Drawings

Mechanical Drawing Items – Phases A and 1:

5MD1. SHEET M3.1 PA – ENLARGED MECHANICAL PLANS

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD2. SHEET M0.0 P1 – MECHANICAL SYMBOLS, ABBREVIATIONS, AND NOTES

1. Miscellaneous General Notes: Add Note 15. as follows: “ALL DUCTWORK, PIPING, CONDUITS, ETC., WHICH ARE INSTALLED IN THE SECOND FLOOR ATTIC SPACES OR ON THIRD FLOOR SHALL NOT BE HUNG FROM THE FLAT CONCRETE ROOF AREAS LOCATED BETWEEN THE ROOF BEAMS. WHERE HANGING FROM THE ROOF IS REQUIRED, EITHER HANG ITEMS DIRECTLY FROM THE STEEL OF THE CONCRETE ENCASED STEEL BEAMS OR FROM UNISTRUT OR ANGLE IRON SUPPORTS WHICH SPAN FROM BEAM TO BEAM. SUPPORTS WHICH SPAN FROM BEAM TO BEAM SHALL BE INSTALLED AS HIGH AS POSSIBLE. THE CONCRETE SERVES AS A FIREPROOFING FOR THE BEAMS. SEE ARCHITECTURAL FOR PATCHING OF THE BEAM’S FIREPROOFING. NEW ITEMS INSTALLED ALONG THE NEW CATWALK SYSTEMS ABOVE THE SECOND FLOOR CORRIDOR CEILINGS SHALL BE SUPPORTED FROM BELOW OFF OF THE NEW CATWALK SYSTEM’S SUPPORT STRUCTURE, SEE ARCHITECTURAL AND STRUCTURAL. INSTALL ALL ITEMS TO ALLOW FOR THE BEST MAINTENANCE ACCESS POSSIBLE. COORDINATE WITH THE OCC FOR ALL HANGING PREFERENCES.”
2. Demolition General Notes:
 - A. Add Note 11 as follows: “SEE SHEET MD4.3 P1 FOR THE EXISTING CHILLED WATER SYSTEM SCHEMATIC.”
 - B. Add Note 12 as follows: “WHERE EXISTING DUCTWORK, PIPING, PNEUMATIC TUBING, CONDUITS, ETC TO REMAIN ARE HUNG FROM DUCTWORK OR PIPING WHICH IS TO BE REMOVED, PLAN TO TEMPORARILY SUPPORT THE ITEM(S) TO REMAIN DURING DEMOLITION. INSTALL NEW HANGERS FOR ALL ITEM(S) TO REMAIN AND ANCHOR THEM TO THE STRUCTURE ABOVE.”
3. Piping General Notes:
 - A. Add Note 14 as follows: “SEE SHEET M4.1 P1 FOR THE HEATING HOT WATER, HEATING GLYCOL HOT WATER, AND HEAT PUMP WATER PIPING SCHEMATICS.”
 - B. Add Note 15 as follows: “SEE SHEET M4.2 P1 FOR THE STEAM SYSTEM PIPING RISER FOR WORK ASSOCIATED WITH THE STEAM RADIATORS.”
 - C. Add Note 16 as follows: “SEE SHEET M4.3 P1 FOR THE CHILLED WATER PIPING SCHEMATIC.”

4. Plumbing General Notes:

- A. Add Note 12 as follows: "ALL CD PIPING SHALL BE 3/4" UNLESS NOTED OTHERWISE ON THE DRAWINGS OR VIA THE SIZING SCHEDULE ON DETAIL 4/M5.1 P1."

5MD3. SHEET MD1.0 P1 – BASEMENT FLOOR DEMO PLAN – SW – HVAC

1. There are two 56/12 RA ducts shown to be removed in Corridor S-C-B just east of Kitchen 41. The north 56/12 RA duct is actually "72/12 RA" and the south 56/12 RA duct is actually "56/16 RA." Update the duct sizes and continue to remove these ducts.

5MD4. SHEET MD1.2 P1 – SECOND FLOOR DEMO PLAN – SW – HVAC

1. West Chamber 2509: Delete the three Flag Note 5s, which are shown in this room.

5MD5. SHEET MD1.3 P1 – THIRD FLOOR DEMO PLAN – SW – HVAC

1. Law Library 325: Add and point a Flag Note 2 to the words "20" DIAM HA/CA DN," which is on the west side of this room.

5MD6. SHEET MD2.0 P1 BASEMENT FLOOR DEMO PLAN – SW – PIPING

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD7. SHEET MD2.0.2 P1 – BASEMENT FLOOR DEMO PLAN – NW – PIPING

1. Flag Note 2: Modify wording as follows: "NOT USED."
2. Mech 35: Remove the abandoned "5" VAC" piping which runs from the far north wall to the far south wall in this room.

5MD8. SHEET MD3.2 P1 – ENLARGED MECHANICAL PLANS DEMO

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD9. SHEET MD3.3 P1 – ENLARGED MECHANICAL PLANS DEMO

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD10. SHEET MD4.3 P1 – MECHANICAL SCHEMATICS DEMO

1. Existing AHU-NW5: The existing three-way control valve shall not be removed. Delete the words "REMOVE EXISTING 3-WAY CHILLED WATER CONTROL VALVE."

5MD11.SHEET M1.0 P1 – BASEMENT FLOOR PLAN – SW – HVAC

1. There is one new 56/12 RA duct shown to be installed in Corridor S-C-B just east of Room 41E. Change this duct size to be “56/14 RA.”
2. Room 6: Move FCU-6 north of the existing Condensate Pump CP-1 to allow for 36” of clear space on the south side of FCU-6 or to allow for the manufacturer’s required clearance, whichever is greater.

5MD12. SHEET M1.0.3 P1 – BASEMENT FLOOR PLAN – NE – HVAC

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD13. SHEET M1.1 P1 – FIRST FLOOR PLAN – SW – HVAC

1. Office 1124: Delete one of the two VRF room temperature sensors shown in this room.

5MD14. SHEET M1.2 P1 – SECOND FLOOR PLAN – SW – HVAC

1. Flag Note 21: Change the wording as follows: “PROVIDE WINDOW TEMPERATURE SENSOR AND CONTROLLER (DRISTEEM MODEL VAPOR LOGIC OR APPROVED EQUAL) FOR USE IN THE HUMIDIFIER SEQUENCE OF CONTROL. MOUNT THE CONTROLLER INSIDE THE WOODEN BENCH BELOW THE WINDOW. DRILL A SMALL HOLE AS INCONSPICUOUSLY AS POSSIBLE IN THE BENCH (IN A LOCATION APPROVED BY THE OCC) AND ROUTE EXPOSED WIRING (AS SHORT AS POSSIBLE) TO THE WINDOW TEMPERATURE SENSOR. MOUNT SENSOR TO WINDOW CORNER AS LOW AS POSSIBLE. CONNECT CONTROLLER OUTPUT TO THE BMCS.”
2. Flag Note 22: Add wording for Flag Note 22 as follows: “PROVIDE WINDOW TEMPERATURE SENSOR AND CONTROLLER (DRISTEEM MODEL VAPOR LOGIC OR APPROVED EQUAL) FOR USE IN THE HUMIDIFIER SEQUENCE OF CONTROL. MOUNT THE CONTROLLER BELOW THE FLOOR, IN THE FIRST FLOOR CEILING CAVITY SPACE. DRILL A SMALL HOLE AS INCONSPICUOUSLY AS POSSIBLE THROUGH THE FLOOR, BEHIND THE NEW PANEL RADIATOR (WITH THE OCC’S APPROVAL) AND ROUTE EXPOSED WIRING (AS SHORT AS POSSIBLE) TO THE WINDOW TEMPERATURE SENSOR. MOUNT SENSOR TO WINDOW CORNER AS LOW AS POSSIBLE. CONNECT CONTROLLER OUTPUT TO THE BMCS.”
3. Lawyer’s Consultation Room 2122: Delete Flag Note 21 and the associated sensor symbol at the north wall and add a sensor at the east side of the east window and point to it with Flag Note 21.
4. Court of Appeals Judges’ Consultation Room 2412A: Delete Flag Note 21 and the associated sensor symbol at the north wall and add a sensor at the east side of the east window and point to it with Flag Note 22.

5MD15.SHEET M1.3 P1 – THIRD FLOOR PLAN – SW – HVAC

1. Law Library 325: Change the Flag Note 1 shown on the east side of this room with a Flag Note 3.

5MD16. SHEET M2.0 P1 – BASEMENT FLOOR PLAN – SW – PIPING

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD17. SHEET M2.0.2 P1 – BASEMENT FLOOR PLAN – NW – PIPING

1. Room 23K: Add and point a Flag Note 2 to the 6" HPWS/R piping in this room.

5MD18. SHEET M2.0.3 P1 – BASEMENT FLOOR PLAN – NE – PIPING

1. Room 20V: Remove the two pipe anchors for the 12" HPWS/R piping in this room.
2. Room 22AV: Remove the two pipe anchors for the 12" HPWS/R piping in this room.

5MD19. SHEET M2.1 P1 – FIRST FLOOR PLAN – SW - PIPING

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD20. SHEET M2.2 P1 – SECOND FLOOR PLAN – SW – PIPING

1. Office 2108: Revise the "3" GHWS/GHWR DN," for the piping in the chase adjacent to this room, to be "3" GHWS/GHWR UP/DN."
2. Court of Appeals Judges' Consultation Room 2412A: Revise the "1-1/2"" GHWS/GHWR piping in this area to be "2"" GHWS/GHWR piping.

5MD21. SHEET M2.2.1 P1 – SECOND FLOOR ATTIC PLAN – SW – PIPING

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD22. SHEET M2.3 P1 – THIRD FLOOR PLAN – SW – PIPING

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD23. SHEET M3.1 P1 – ENLARGED MECHANICAL PLANS

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD24. SHEET M3.3 P1 – ENLARGED MECHANICAL PLANS

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD25. SHEET M3.4 P1 – ENLARGED MECHANICAL PLANS

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD26. SHEET M3.5 P1 – ENLARGED MECHANICAL PLANS

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD27. SHEET M3.6 P1 – ENLARGED MECHANICAL PLANS

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD28. SHEET M3.7 P1 – ENLARGED MECHANICAL PLANS – MECHANICAL ROOMS

1. Flag Note 5: Modify wording as follows: “CROSSHATCHED DUCTWORK INDICATES ORIGINAL DUCTWORK TO BE CLEANED, SEE SPECIFICATIONS. THIS RETURN AIR DUCTWORK SERVES THE WEST CHAMBER 2509 TOE-KICK GRILLES AT THE SENATOR’S DESKS. COORDINATE THE SHUTDOWN OF AHU-N2 WITH THE OCC FOR THIS CLEANING.”

5MD29. SHEET M3.8 P1 – ENLARGED MECHANICAL PLANS

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD30. SHEET M4.1 P1 – MECHANICAL SCHEMATICS

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD31. SHEET M4.2 P1 – MECHANICAL SCHEMATICS

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD32. SHEET M4.3 P1 – MECHANICAL SCHEMATICS

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD33. SHEET M5.1 P1 – MECHANICAL DETAILS

1. Water to Water Plate Heat Exchanger 7/M5.1 P1: Delete the Y strainer located on the GHWR piping.

5MD34. SHEET M5.2 P1 – MECHANICAL DETAILS

1. Refer to clouded areas for revisions on attached reissued sheet.

5MD35. SHEET M5.3 P1 – MECHANICAL DETAILS

1. Typical Vertical VRF Fan Coil Section 3/M5.3 P1:
 - A. At the “RS/RL (RIDGID COVER...” note, modify the word “COVER” to be “COPPER.”
 - B. Add the following note to this detail: “NOTE: TYPE K SOFT COPPER MAY BE USED FOR THE CD PIPING EXTENDING FROM THE FAN COIL DRAIN PAN DOWN TO BELOW THE FLOOR. TRANSITION TO HARD COPPER CD PIPING BELOW THE FLOOR AND AS CLOSE TO THE CORE DRILL LOCATION AS POSSIBLE.”
2. Panel Radiator 9/M5.3 P1: Note that the balance valve is an “AUTO FLOW BALANCE VALVE.”

5MD36. SHEET M6.1 P1 – MECHANICAL SCHEDULES

1. Refer to clouded areas for revisions on attached reissued sheet.

Electrical Drawing Items – Phases A and 1

5ED1. SHEET E0.0 PA – ELECTRICAL SYMBOLS AND ABBREVIATIONS

1. Miscellaneous General Notes: Add Note 14 as follows: “ALL LIGHTING FIXTURES, CONDUITS, JUNCTION BOXES, ETC. WHICH ARE INSTALLED IN THE SECOND FLOOR ATTIC SPACES OR ON THIRD FLOOR SHALL NOT BE HUNG FROM THE FLAT CONCRETE ROOF AREAS LOCATED BETWEEN THE ROOF BEAMS. WHERE HANGING FROM THE ROOF IS REQUIRED, EITHER HANG ITEMS DIRECTLY FROM THE STEEL OF THE CONCRETE ENCASED STEEL BEAMS OR FROM UNISTRUT OR ANGLE IRON SUPPORTS WHICH SPAN FROM BEAM TO BEAM. SUPPORTS WHICH SPAN FROM BEAM TO BEAM SHALL BE INSTALLED AS HIGH AS POSSIBLE. THE CONCRETE SERVES AS A FIREPROOFING FOR THE BEAMS. SEE ARCHITECTURAL FOR PATCHING OF THE BEAM’S FIREPROOFING. NEW ITEMS INSTALLED ALONG THE NEW CATWALK SYSTEMS ABOVE THE SECOND FLOOR CORRIDOR CEILINGS SHALL BE SUPPORTED FROM BELOW OFF OF THE NEW CATWALK SYSTEM’S SUPPORT STRUCTURE, SEE ARCHITECTURAL AND STRUCTURAL. INSTALL ALL ITEMS TO ALLOW FOR THE BEST MAINTENANCE ACCESS POSSIBLE. COORDINATE WITH THE OCC FOR ALL HANGING PREFERENCES.”

5ED2. SHEET ED1.0 PA – BASEMENT FLOOR DEMO PLAN – SW – ELECTRICAL

1. Flag Note 5: Modify to read as follows: “REMOVE SUBSTATION #2, 1000 KVA PAD MOUNTED TRANSFORMER. TRANSFORMER CONTAINS R-TEMP FLUID, AND IS LABELED NON-PCB TRANSFORMER.”
2. Flag Note 14: Modify to read as follows: “REMOVE SUBSTATION #1, 1000 KVA PAD MOUNTED TRANSFORMER. TRANSFORMER CONTAINS R-TEMP FLUID, AND IS LABELED NON-PCB TRANSFORMER.”

5ED3. SHEET E2.0.4 PA – TUNNEL AND AT-GRADE PLAN – MEDIUM VOLTAGE ROUTE AND MEDIUM VOLTAGE RISER DIAGRAM

1. Detail 1: Tunnel And At-Grade Plan – Medium-Voltage Route and Generator Control Wiring Route: In the 501 Building, wiring closet at the west end of the tunnel, the new fiber optic cable shall be installed in 4" RGS conduit between the two duct banks.
2. Detail 3: Generator Control Wiring Riser Diagram: In the 501 Building, wiring closet at the west end of the tunnel, the new fiber optic cable shall be installed in 4" RGS conduit between the two duct banks.

5ED4. SHEET E6.1 PA – ELECTRICAL SCHEDULES

1. Transformer Schedule:
 - A. Transformer 'T2': In the Remarks column, add Remark 3.
 - B. Add Remark 3 at the bottom of the schedule to read as follows: "TRANSFORMER 'T2' MUST BE MOVED INTO POSITION WHILE EXISTING SUBSTATION #2 TRANSFORMER, PAD, AND SWITCHBOARD ARE STILL IN USE. WIDTH OF OPENING AVAILABLE FOR TRANSFORMER CLEARANCE IS +/- 69". Contractor to verify and provide transformer capable of fitting through available space.

5ED5. SHEET E0.0 P1 – ELECTRICAL SYMBOLS AND ABBREVIATIONS

1. Miscellaneous General Notes: Add Note 13 as follows: ALL LIGHTING FIXTURES, CONDUITS, JUNCTION BOXES, ETC. WHICH ARE INSTALLED IN THE SECOND FLOOR ATTIC SPACES OR ON THIRD FLOOR SHALL NOT BE HUNG FROM THE FLAT CONCRETE ROOF AREAS LOCATED BETWEEN THE ROOF BEAMS. WHERE HANGING FROM THE ROOF IS REQUIRED, EITHER HANG ITEMS DIRECTLY FROM THE STEEL OF THE CONCRETE ENCASED STEEL BEAMS OR FROM UNISTRUT OR ANGLE IRON SUPPORTS WHICH SPAN FROM BEAM TO BEAM. SUPPORTS WHICH SPAN FROM BEAM TO BEAM SHALL BE INSTALLED AS HIGH AS POSSIBLE. THE CONCRETE SERVES AS A FIREPROOFING FOR THE BEAMS. SEE ARCHITECTURAL FOR PATCHING OF THE BEAM'S FIREPROOFING. NEW ITEMS INSTALLED ALONG THE NEW CATWALK SYSTEMS ABOVE THE SECOND FLOOR CORRIDOR CEILINGS SHALL BE SUPPORTED FROM BELOW OFF OF THE NEW CATWALK SYSTEM'S SUPPORT STRUCTURE. SEE ARCHITECTURAL AND STRUCTURAL. INSTALL ALL ITEMS TO ALLOW FOR THE BEST MAINTENANCE ACCESS POSSIBLE. COORDINATE WITH THE OCC FOR ALL HANGING PREFERENCES."

5ED6. SHEET ED1.0 P1 – BASEMENT FLOOR DEMO PLAN – SW – ELECTRICAL

1. Room 12E: Disconnect and remove the electrical from each of the following:
 - A. One steam unit heater.
 - B. Two water pump motors.

5ED7. SHEET ED1.1 P1 – FIRST FLOOR DEMO PLAN – SW – ELECTRICAL

1. Refer to clouded areas for revisions on attached reissued sheet.

5ED8. SHEET ED1.2 P1 – SECOND FLOOR DEMO PLAN – SW – ELECTRICAL

1. Refer to clouded areas for revisions on attached reissued sheet.

5ED9. SHEET ED1.3 P1 – THIRD FLOOR DEMO PLAN – SW – ELECTRICAL

1. Refer to clouded areas for revisions on attached reissued sheet.

5ED10. SHEET ED1.4 P1 – PARTIAL DEMO FLOOR PLANS – ELECTRICAL

1. Refer to clouded areas for revisions on attached reissued sheet.

5ED11. SHEET E1.1 P1 – FIRST FLOOR PLAN – SW – LIGHTING

1. Refer to clouded areas for revisions on attached reissued sheet.

5ED12. SHEET E1.2 P1 – SECOND FLOOR PLAN – SW – LIGHTING

1. Refer to clouded areas for revisions on attached reissued sheet.

5ED13. SHEET E1.3 P1 – THIRD FLOOR PLAN – SW – LIGHTING

1. Refer to clouded areas for revisions on attached reissued sheet.

5ED14. SHEET E1.4 P1 – PARTIAL FLOOR PLANS – SW – LIGHTING

1. Refer to clouded areas for revisions on attached reissued sheet.

5ED15. SHEET E2.0 P1 – BASEMENT FLOOR PLAN – SW-POWER

1. Room 6: Provide a new duplex receptacle on the west wall to serve the relocated water softener. Locate just north of FCU-6. Mount at 46". Connect new receptacle to the existing convenience receptacle circuit serving this room.
2. Sub Station 2 – Room 40: Tag the new make-up air unit shown just north of FCU-40 as MAU-1.

5ED16. SHEET E2.1 P1 – FIRST FLOOR PLAN – SW – POWER

1. Cafeteria 1418: Delete equipment tag for HD-2.

5ED17. SHEET E3.0.1 P1 – BASEMENT FLOOR PLAN – NW – MASS NOTIFICATION

1. Refer to clouded areas for revisions on attached reissued sheet.

5ED18. SHEET E6.2 P1 – ELECTRICAL SCHEDULES

1. Luminaire Schedule: The following lighting fixture manufacturers are considered equivalent for bidding purposes, if equal to the specified lighting fixtures and are subject to final shop drawing review. Light fixtures may be rejected during the shop drawing review process if the Architect, Owner, or Engineer(s) review does not find the submitted lighting fixture(s) to be equivalent.
 - A. Fixture Type 8: Add the following under “Alternate Manufacturers”: Spectrum Lighting, Inc.
 - B. Fixture Type 9: Add the following under “Alternate Manufacturers”: Spectrum Lighting, Inc.
 - C. Fixture Type 10: Add the following under “Alternate Manufacturers”: Spectrum Lighting, Inc.

END

PAB-GAN/mdg

SECTION 230993 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 GENERAL

1.1 ADMONITION

- A. The United States Department of the Interior has recognized the Nebraska State Capitol as a registered National Historic Landmark (NHL) possessing exceptional architectural, historic and cultural value for our nation. Original building and site details, finishes and furnishings are of the highest quality available, both in terms of material and craftsmanship. It is the mission of the Office of the Capitol Commission to insure that the work performed under construction and service contracts be of a quality equal or superior to the original construction. Only qualified, experienced contractors/craftsmen who recognize the exceptional value of this landmark and can perform to the highest standards will be employed.

1.2 SECTION INCLUDES

- A. This section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other sections and in Point Lists (attached)
- B. Sequence of operation for:
 - 1. Air terminal units.
 - 2. Modular heat recovery heat pump chillers.
 - 3. Chilled water system .
 - 4. Heating water systems.
 - 5. Geothermal condenser/heat pump systems.
 - 6. Variable air volume air handling unit.
 - 7. Single zone air handling unit.
 - 8. Kitchen makeup unit.
 - 9. Exhaust fans.
 - 10. Cabinet heaters.
 - 11. Fan coil units.
 - 12. Humidifiers.
 - 13. Radiation and convectors.
 - 14. Unit heaters.
 - 15. Energy Management Strategies
 - a. Cascade Temperature Control
 - b. Critical zone reset: AHU Duct Static Pressure
 - c. AHU DAT Reset: Linear OAT
 - d. AHU: CO2 demand ventilation - Air flow sensors with variable occupancy
 - e. Continuous Commissioning of BMCS
 - f. Zone space temperature offset
 - g. Zone space temperature offset: Unoccupied weekend temperature control

1.3 SYSTEM DESCRIPTION

- A. This Section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other Sections.

- B. Refer to separate, attached, Point Lists for additional monitoring and controlling systems and components.

1.4 INITIAL EQUIPMENT AND SYSTEM SETPOINTS

- A. Final operating setpoints will be determined by the test and balance contractor, owner/user representatives, etc.
- B. Initial (adjustable) setpoints apply to sequences described below in Part 3.
- C. Initial Temperature Setpoints:
 - 1. Space Occupied Cooling: 75°F
 - 2. Space Occupied Heating: 70°F
 - 3. Space Cooling Unoccupied (Night) Setback: 85°F
 - 4. Space Heating Unoccupied (Night) Setback: 60°F
 - 5. Space Unoccupied (Night) Setback: +/- 10°F from Occupied Setpoint.
 - 6. Chilled Water Supply (CWS): 43°F
 - 7. Heating Water Supply (HWS): 130°F
 - 8. Glycol Heating Water Supply (GHWS): 128°F
 - 9. Condenser/Heat Pump Water (HPWS) Range: 50-100°F
 - 10. Variable Volume Air Handling Unit Discharge Air: 55°F
 - 11. Energy Recovery Unit Discharge Air: 75°F Summer, 68°F Winter.
 - 12. Make-Up Air Unit Discharge Air: 65°F (Minimum)
 - 13. HX-1 Outlet: 128°F
 - 14. HX-2 Outlet: 80°F
 - 15. HX-3 Outlet Warm: 100°F
 - 16. HX-3 Outlet Cool: 127°F
- D. Initial Pressure Setpoints:
 - 1. Chilled Water Pump (CWP) Differential: 15 psig.
 - 2. Heating Water Pump (HWP) Differential: 15 psig.
 - 3. Glycol Heating Water Pump (GHWP) Differential: 15 psig.
 - 4. Variable Volume Air Handling Unit Discharge: 1.5 in. w.g.
 - 5. Space Static Differential: .002 in. w.g.
 - 6. Building Static Differential: .01 in. w.g.
- E. Initial Relative Humidity Setpoints:
 - 1. Space, Summer: 50% @ 75°F, +/- 5%
 - 2. Space, Winter: 25% @ 70°F, +/- 5%
 - 3. Humidifier Downstream High Limit, 65%
- F. Initial CO2 Setpoints:
 - 1. 500 ppm above ambient alarm.
 - 2. 800 ppm above ambient high limit.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Specification Compliance Review.
 - 1. Shall also indicate compliance to all sequences and itemized Point List requirements.

- C. Sequence of Operation Documentation: Submit written sequence of operation for entire HVAC system and each piece of equipment.
1. Preface: 1 or 2 paragraph overview narrative of the system describing its purpose, components and function.
 2. State each sequence in small segments and give each segment a unique number for referencing in Functional Test procedures; provide a complete description regardless of the completeness and clarity of the sequences specified in the contract documents.
 3. Include at least the following sequences:
 - a. System off.
 - b. Start-up.
 - c. Warm-up mode.
 - d. Normal operating mode.
 - e. Unoccupied mode.
 - f. Shutdown.
 - g. Capacity control sequences and equipment staging.
 - h. Temperature and pressure control, such as setbacks, setups, resets, etc.
 - i. Detailed sequences for all control strategies, such as economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
 - j. Effects of power or equipment failure with all standby component functions.
 - k. Sequences for all alarms and emergency shut downs.
 - l. Seasonal operational differences and recommendations.
 - m. Interactions and interlocks with other systems.
 4. Include initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
 5. For packaged controlled equipment, include manufacturer's furnished sequence of operation amplified as required to describe the relationship between the packaged controls and the control system, indicating which points are adjustable control points and which points are only monitored.
 6. Include schedules, if known.
- D. Control System Diagrams: Submit graphic schematic of the control system showing each control component and each component controlled, monitored, or enabled.
1. Label with settings, adjustable range of control and limits.
 2. Include flow diagrams for each control system, graphically depicting control logic.
 3. Include the system and component layout of all equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
 4. Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.
 5. Include all monitoring, control and virtual points specified in elsewhere.
 6. Include a key to all abbreviations.
- E. Points List: Submit list of all control and monitor points indicating at least the following for each point.
1. Name of controlled system.
 2. Point abbreviation.
 3. Point description; such as dry bulb temperature, airflow, etc.
 4. Display unit.
 5. Control point or setpoint (Yes / No); i.e. a point that controls equipment and can have its setpoint changed.
 6. Monitoring point (Yes / No); i.e. a point that does not control or contribute to the control of equipment but is used for operation, maintenance, or performance verification.

7. Intermediate point (Yes / No); i.e. a point whose value is used to make a calculation which then controls equipment, such as space temperatures that are averaged to a virtual point to control reset.
 8. Calculated point (Yes / No); i.e. a "virtual" point generated from calculations of other point values.
- F. Project Record Documents: Record actual locations of components and setpoints of controls, including changes to sequences made after submission of shop drawings.

1.6 CONTROL SYSTEM INTERFACES

- A. System shall fully support a multi-vendor environment and be able to interface and integrate third party systems and sequences via vendor protocols including, as a minimum, BACnet, LonTalk and Modbus.
- B. System and Equipment to BMCS Interfaces shall be provided for, but not limited to:
1. Manufacturer's packaged system control panels.
 2. Packaged Unitary Equipment.
 3. Pumps and Pumping Packages.
 4. Heat Exchanger Packages.
 5. Variable Frequency Controllers.
 6. Air-Handling Units.
 7. Energy Recovery Ventilators and Units.
 8. Plumbing Pumps
 9. Sewage Ejectors
 10. Lighting Control System
 11. Heat Trace and Deicing Panels
 12. Electrical Sub-metering
 13. Kitchen Ventilation System
 14. Heat Recovery Chiller Management Systems
 15. Packaged Equipment Controls
 16. Building Dashboard
- C. A watchdog procedure must be implemented that enables the identification of the point of failure, i.e., where in the communications chain between the two systems did the failure occur. The watchdog function must operate at a frequency that detects a failure within 60 seconds.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 OPERATING SEQUENCES - GENERAL

- A. Sequence of Control indicated illustrates basic control function only. Provide all control devices required for controlling air handling units, exhaust fans, physical plant equipment, terminal equipment, and all related items. Provide monitoring only devices as indicated.
- B. The Control Contractor shall perform the initial input of all required operational data for each point that is to be used based on information supplied to the Contractor by the Owner. The Contractor shall assist the Owner's staff in developing the schedule and shall demonstrate the operation of the system using the data.

- C. Provide adequate English language notation in the software to assist the operator in understanding the intent of the programmed sequences.
- D. The Control Contractor shall be responsible for the stable operation of all control loops. If the Control Contractor has not provided self-tuning PID control algorithms then the Control Contractor shall manually tune all control loops. Verify all control loops are stable whether or not they are self-tuning.
- E. The Control Contractor shall provide any modifications to the operating sequence programs as requested by the Owner without additional costs until the final acceptance of the entire control system.
- F. All outputs using PID control shall be adjusted to the actual range of end device. Example: If VFC range is from 20% to 100%, output PID loop shall run from 20%-100% to eliminate spooling of PID outside actual operating range of end device.
- G. Graphics shall represent actual range of outputs.
- H. Refer to separate, attached, Point Lists for additional monitoring and controlling systems and components.

3.2 EQUIPMENT RUN TIME TOTALIZATION

- A. Provide a software package that will accumulate the operating times for motors as selected by the operator using an interactive procedure. Any piece of equipment that has its status monitored by the building management control system (BMCS) shall be selectable for inclusion in this feature. It shall be possible to concurrently monitor the accumulated operating time for every item of equipment monitored and/or controlled by the BMCS.
- B. The operator shall be able to establish on-line, using an interactive procedure, a value for the accumulated operating time at which a suitably worded message shall be output to the operator advising that the reporting limit has been reached for a specific motor. The message shall be output at the designated alarm printer.
- C. The operator shall be able to change the accumulated total for any motor to any value.
- D. The accumulated operating times shall be updated at least every 15 minutes.
- E. The operator shall be able to obtain on demand or on a scheduled basis a report detailing the accumulated operating times.
- F. Operating time software shall be used as the basis for equipment operating selection and standby status. Changeover of units based on operating times shall not take place more than an operator-defined period, initially set at once per week.

3.3 NIGHT (UNOCCUPIED) SETBACK - SETUP (**APPLIES TO NON-VRF SYSTEMS**)

- A. Provide a software program that shall:
 1. Start HVAC equipment after normal hours of scheduled operation to maintain building after-hour setpoints, while reducing energy consumption.
 2. Night setback temperatures for heating shall be initially set at 65 degrees F to activate the heating equipment and 68 degrees F to stop the heating equipment. Once activated, the

- units involved shall operate as specified in the respective sequence of operation.
Coordinate the operation of this program with the requirements for terminal unit controls.
3. Night setup temperatures for cooling shall be initially set at 80 degrees F to activate the cooling equipment and 77 degrees F to stop the cooling equipment. Once activated, the units involved shall operate as specified in the respective sequence of operation.
Coordinate the operation of this program with the requirements for terminal unit controls.

- B. The operator shall be able to implement this function for all HVAC equipment using an interactive procedure on an individual or group-controlled basis.
- C. The operator shall be able to assign minimum run times for each piece of equipment.
- D. The operation of this program shall be disabled when the outside air temperature is outside operator defined limits, initially set at 35 degrees F and 95 degrees F.
- E. A report shall be available on demand and on a scheduled basis, which provides the following information:
 - 1. Night setback/setup setpoints and associated equipment.
- F. This feature shall only be implemented for equipment in the BMCS software control mode.
- G. Setpoints for each associated piece of equipment shall be displayed on the associated system display graphics. Setpoints shall be changeable via the graphical display.
- H. The current status of night setback - setup modes shall be indicated on the associated system graphic.

3.4 OPTIMIZED SCHEDULING

- A. Provide an adaptive software program that shall:
 - 1. Start HVAC equipment at the latest possible time while ensuring that space in the building reaches setpoint conditions by the time occupancy commences.
 - 2. Stop HVAC equipment at the earliest possible time while ensuring that space in the building shall still be within the setpoint deadband at the scheduled end of occupancy.
- B. The operator shall be able to implement this function for each group of terminal units and other HVAC equipment using an interactive procedure. A group of terminal units shall comprise all the terminal units on the same floor of the tower served by the same air handling unit. The operator shall be able to assign start of occupancy and end of occupancy times for each day of the week and for holidays. A separate Monday schedule should be provided for earlier start times.
- C. This program shall base the determined equipment start and stop times on monitored data such as space temperatures within the area served by the equipment and ambient conditions. If the BMCS subcontractor requires information other than that provided by the monitoring detailed in the Field Termination Schedules, then the necessary additional instrumentation shall be provided within the base bid price.
- D. The operator shall be able to assign limits to the start and stop times. Initially these limits shall be set as follows:
 - 1. BMCS determined start times shall not be more than three hours before the scheduled occupancy.
 - 2. BMCS determined stop times shall not be more than one hour before the scheduled end of occupancy.

- E. A report shall be available on demand and on a scheduled basis, which provides the following information:
 - 1. Occupancy schedules.
 - 2. Time of last equipment start and space conditions at scheduled occupancy time.
 - 3. Time of last equipment stop and space conditions at scheduled end of occupancy time.
- F. This feature shall only be implemented for equipment in the BMCS software control mode.

3.5 ENERGY MANAGEMENT STRATEGIES

- A. Apply additional emergency management strategies listed below to the applicable systems.

3.6 AIR TERMINAL UNITS

- A. Single-Duct Variable Volume (Cooling Only):
 - 1. System Off - When the system is off:
 - a. The primary air damper shall be closed.
 - 2. Initiation of System Start-Up - The system shall be started:
 - a. Manually initiated by operator through BMCS.
 - b. Automatically by BMCS through occupancy schedule.
 - 3. System Operation - After system start-up has been initiated the following shall occur:
 - a. The primary air damper shall modulate to the maximum primary airflow rate indicated to maintain the space cooling temperature setpoint.
 - 4. System Shutdown - Shall be initiated as follows:
 - a. Manually initiated by operator through BMCS.
 - b. Automatically by BMCS through occupancy schedule.
 - 5. System Setpoints - The setpoints shall be operator changeable and initially set as follows:
 - a. The minimum and maximum primary air flow setpoints shall be set to the design airflow setpoints as indicated in the contract documents.
 - b. The high and low temperature setpoints shall be set initially at 2 degrees F above/below the cooling temperature setpoint.
 - c. The occupant shall have the capability to adjust the space temperature setpoint through the space temperature sensor.
 - d. The programming shall limit user adjustment to + or - 2 degrees F of the base setpoint.
 - 6. Alarms - The BMCS shall generate an alarm for the following conditions:
 - a. High temperature.
 - b. Low temperature.
- B. Single-Duct Variable Volume with Heat:
 - 1. System Off - When the system is off:
 - a. The primary air damper shall be closed.
 - b. The heating shall be closed or off.
 - 2. Initiation of System Start-Up - The system shall be started:
 - a. Manually initiated by operator through BMCS.
 - b. Automatically by BMCS through occupancy schedule.
 - 3. System Operation - After system start-up has been initiated the following shall occur:
 - a. The primary air damper shall modulate to the maximum primary airflow rate indicated to maintain the space cooling temperature setpoint.
 - b. When the space temperature falls below the space heating temperature setpoint the following shall occur:

- 1) The primary air damper shall be set to the minimum primary air flow rate indicated.
 - 2) The heating water valve or electric coil controller shall modulate to maintain the space heating temperature setpoint.
 - 3) The discharge air temperature sensor shall limit discharge air temperature to no more than 20 degrees above space setpoint.
 - 4) Upon further call for heating, the primary air damper shall modulate to the maximum heating air flow rate indicated.
4. System Shutdown - Shall be initiated as follows:
 - a. Manually initiated by operator through BMCS.
 - b. Automatically by BMCS through occupancy schedule.
 5. System Setpoints - The setpoints shall be operator changeable and initially set as follows:
 - a. The minimum and maximum primary air flow setpoints shall be set to the design airflow setpoints as indicated in the contract documents.
 - b. The high and low temperature setpoints shall be set initially at 2 degrees F above/below the temperature setpoints.
 - c. The occupant shall have the capability to adjust the space temperature setpoint through the space temperature sensor.
 - d. The programming shall limit user adjustment to + or - 2 degrees F of the base setpoint.
 6. Alarms - The BMCS shall generate an alarm for the following conditions:
 - a. High temperature.
 - b. Low temperature.

3.7 CHILLED/HEATING WATER SYSTEM (CWS & HWS)

- A. System Off - When the system is off:
 1. The chilled, heating and condenser water pumps shall be off.
 2. The heat recovery chiller shall be disabled.
 3. The heat recovery chiller isolation valves shall be closed.
 4. The heat recovery chilled water bypass valve shall be open.
- B. Initiation of System Start-Up - The system shall be started:
 1. Manually initiated by operator through BMCS.
 2. Automatically by the BMCS whenever there is a requirement for chilled water, or if the outdoor air temperature is above the free cooling setpoint.
- C. System Operation - After system start-up has been initiated the following shall occur:
 1. Once mechanical heating or cooling has been enabled, the chiller and associated pumps shall be selected by one of the following operator selectable methods:
 - a. Operator selection of individual equipment.
 - b. Run times to equalize equipment operations.
 - c. Operator selected lead/lag staging sequences.
 2. The chilled water and condenser water isolation valves shall open for the chiller. Status shall prove open before starting pumps.
 3. The heating, chilled and condenser water pumps shall start and the chiller shall be enabled.
 4. The chilled and heating water supply setpoints shall be adjustable through the BMCS via a BACnet interface.
- D. System Shutdown - Shall be initiated as follows:
 1. Manually initiated by operator through BMCS.
 2. Automatically by the BMCS whenever there is not a requirement for chilled water, or if the outdoor air temperature is below the free cooling setpoint.

- E. System Setpoints - The setpoints shall be operator changeable and initially set as follows:
 - 1. The chilled water supply temperature setpoint shall be 44 degrees F.
 - 2. The heating water supply temperature setpoint shall be 130 degrees F.
 - 3. The high/low temperature alarm setpoint shall be set initially at 2 degrees F above/below the temperature setpoint.
- F. Alarms - The BMCS shall generate an alarm for the following conditions:
 - 1. Chiller failure.
 - 2. Chiller general alarm.
 - 3. Low evaporator differential pressures.
 - 4. High/low chilled water supply temperature.
 - 5. High/low heating water supply temperature.
- G. Failure Positions - The following shall occur upon component failure or loss of power:
 - 1. Chiller shall remain in the last commanded state.
 - 2. Chilled water bypass valve shall fail in place.
 - 3. Chiller isolation valves shall fail in place.

3.8 CONDENSER WATER (HEAT PUMP) SYSTEM (**HPWS & R**)

- A. System Off - When the system is off:
 - 1. The heat pump/condenser water pumps shall be off.
 - 2. The heat pump/condenser water bypass valve shall be closed.
- B. Initiation of System Start-Up - The system shall be started:
 - 1. Manually initiated by operator through BMCS.
 - 2. Automatically by the BMCS when a chiller is in operation.
 - 3. Condenser water pumps shall start whenever the heat recovery and/or VRF condensers are enabled.
 - 4. Condenser water pumps shall start whenever the chilled and/or heating water pumps are enabled.
- C. System Operation - After system start-up has been initiated the following shall occur:
 - 1. The lead heat pump/condenser water pump shall operate as described in the chilled water system sequence. Pump shall not start unless the chiller isolation valves prove open.
 - 2. The heat pump/condenser water pump speed shall modulate to maintain the system differential pressure setpoint. This sensor should be located at least 2/3 the way down the system. The pump shall operate to satisfy the higher of two pressure differentials, the system differential pressure or to enable the heat recovery chiller's HPWS pressure control valve located at the heat recovery chiller's HPWS piping connection to satisfy the condenser heat exchanger bundle pressure differential setpoint. If multiple pumps are operating, their speeds shall be controlled by a common signal.
- D. System Shutdown - Shall be initiated as follows:
 - 1. Manually initiated by operator through BMCS.
 - 2. Automatically by the BMCS if none of the chillers are in operation.
- E. Alarms - The BMCS shall generate an alarm for the following conditions:
 - 1. High/low heat condenser water supply temperature.
 - 2. Condenser water flow.
- F. Failure Positions - The following shall occur upon component failure or loss of power:

1. Pumps shall remain in the last commanded state.

G. Points List:

1. Software Interface - The following points shall be provided through the BACnet interface.
(Typical for each VFC)
 - a. VFC speed reference feedback.
 - b. VFC fault.
 - c. Motor power in HP.
 - d. Motor kWh.
 - e. Motor current.
 - f. Motor voltage.
 - g. Runtime in hours.
 - h. DC link voltage.
 - i. Thermal load on motor.

3.9 CHILLED WATER SYSTEMS (CWS)

A. System Off - When the system is off:

1. The chiller water pumps shall be off.

B. Initiation of System Start-Up - The system shall be started:

1. Manually initiated by operator through BMCS.
2. Automatically by the BMCS base on a time schedule or whenever there is a requirement for heating.

C. System Operation - After system start-up has been initiated the following shall occur:

1. The chilled water pump speed shall modulate to maintain the system differential pressure setpoint. This sensor should be located at least 2/3 the way down the system or in the location indicated on the mechanical drawings. If multiple pumps are operating, their speeds shall be controlled by a common signal.

D. System Shutdown - Shall be initiated as follows:

1. Manually initiated by operator through BMCS.
2. Automatically by the BMCS base on a time schedule or whenever there is not a requirement for heating.

E. System Setpoints - The setpoints shall be operator changeable and initially set as follows:

1. The chilled water pump differential pressure setpoint shall be 15 psi.

F. Alarms - The BMCS shall generate an alarm for the following conditions:

1. Water flow, pump failure.

G. Failure Positions - The following shall occur upon component failure or loss of power:

1. Pumps shall remain in the last commanded state.

H. Points List:

1. Software Interface - The following points shall be provided through the BACnet interface.
(Typical for each VFC)
 - a. VFC speed reference feedback.
 - b. VFC fault.
 - c. Motor power in HP.
 - d. Motor kWh.
 - e. Motor current.

- f. Motor voltage.
- g. Runtime in hours.
- h. DC link voltage.
- i. Thermal load on motor.

3.10 HEATING WATER SYSTEMS (HWS & GHWS)

- A. System Off - When the system is off:
 - 1. The heating water pumps shall be off.
- B. Initiation of System Start-Up - The system shall be started:
 - 1. Manually initiated by operator through BMCS.
 - 2. Automatically by the BMCS base on a time schedule or whenever there is a requirement for heating.
- C. System Operation - After system start-up has been initiated the following shall occur:
 - 1. Packaged heat exchanger control enabled.
 - 2. The lead heating water pump shall be selected by one of the following operator selectable methods:
 - a. Operator selection of individual equipment.
 - b. Run times to equalize equipment operations.
 - c. The lead pump shall start.
 - 3. The heating water pump speed shall modulate to maintain the system differential pressure setpoint. This sensor should be located at least 2/3 the way down the system or in the location indicated on the mechanical drawings. If multiple pumps are operating, their speeds shall be controlled by a common signal.
 - 4. If a pump fails in service the unit shall be disabled and the standby pump shall be enabled without any time delays.
- D. Additional System System Operation Sequences:
 - 1. HX-3A & B, HWR control valves, 2 position, pressure independent valve; Valves shall take 4 minutes for full closing. Both valves 1 & 2 shall fail open.
 - 2. HX-3A & B, GHWR control valves, modulating, pressure independent valve; Valves shall take 4 minutes for full closing.
 - 3. BMCS monitors all four water temps coming into and out of both HX-3A&B. BMCS shall measure GHWS temp in the full flow main pipe before and after the side stream connections to HX-1.
 - 4. BMCS monitors HRC bundle delta P across all three hydronic systems: Chilled, heating and condenser water.
 - a. BMCS controls HWP-1 which has three flow points: zero when no HRC module is in a heating mode. ½ flow when one HX-3 is open, full flow when both HX-3s are open.
 - b. For heating mode startup: HRC tells BMCS how many modules are in heating mode or that HRC has heating water being produced, and BMCS commands open valve 1 or 2 (whichever is set to lead), commands HWP-1 to run.
 - 1) HWP-1 controls to satisfy the required flow rate, (half flow in startup mode) by reference to the chiller's dedicated HWS flow meter.
 - c. HX-3A&B control goal is to make 127F water, in sequence, supplied to the building as measured by BMCS downstream of both HXs piping connection points. At startup of the heating water operations, if GHWS temp is below setpoint, HRC operates to produce heating water.
 - d. When heating water flow is recognized valve opens, HWP-1 goes to ½ flow, and valve modulates open to satisfy GHWS setpoint.

- 1) If after 10 minutes (adj.) of HX-3A HWR valve being wide open and GHWS is still below setpoint, HX-3B HWR valve shall open,
 - 2) HWP-1 shall go to full flow, and GHWS valves modulate in unison to maintain GHWS setpoint.
 - e. For unloading: If GHWR control valves are both below 20% open (adj.) for more than 5 minutes (adj.), then GHWR 3A valve modulate closed, HWP-1 shall go to half flow, HWR 3A valve shall close, and GHWR 3B shall modulate to maintain GHWS setpoint. If GHWR 3B valve is modulated closed, HWP-1 shall shut off and HWR 3B shall close.
 - f. Lead/lag alternation on monthly basis for HX-3A&B shall be provided with appropriate alarms and running of alternate HX if any failure.
- E. System Shutdown - Shall be initiated as follows:
1. Manually initiated by operator through BMCS.
 2. Automatically by the BMCS base on a time schedule or whenever there is not a requirement for heating.
- F. System Setpoints - The setpoints shall be operator changeable and initially set as follows:
1. The high/low temperature alarm setpoint shall be set initially at 10 degrees F above/below the temperature setpoint.
- G. Alarms - The BMCS shall generate an alarm for the following conditions:
1. Water flow, pump failure.
 2. High/low heating water supply temperature.
- H. Failure Positions - The following shall occur upon component failure or loss of power:
1. Pumps shall remain in the last commanded state.
 2. Heat exchanger control shall fail in the last command state.
- I. Points List:
1. Software Interface - The following points shall be provided through the BACnet interface. (Typical for each VFC)
 - a. VFC speed reference feedback.
 - b. VFC fault.
 - c. Motor power in HP.
 - d. Motor kWh.
 - e. Motor current.
 - f. Motor voltage.
 - g. Runtime in hours.
 - h. DC link voltage.
 - i. Thermal load on motor.

3.11 HEAT RECOVERY CHILLER (**HRC-1**) (ADDITIONAL ENHANCED SEQUENCES)

- A. Upon power loss & on generator: HRC master controller will have UPS power. Upon power loss, the HRC will shut down. Valves will stay in last commanded position in this off mode.
1. Master controller will take 3 minutes to reboot & self-diagnose.
- B. HRC will be brought up by closing module valves, and loaded heating or cooling from “square one” as needed by the system.
- C. Future modification to do load shedding under emergency power: Means of limiting number of modules that can come on line, or lowering the CWS temperature are options that can be set up. BMCS can be integrated with HRC Factory controls to recognize on emergency power,

whether there is a need to limit power demand, and have BMCS command the factory controls to these parameters.

3.12 SINGLE ZONE AIR HANDLING UNIT (CONSTANT VOLUME) (**AHU-2123, AHU-BNW1, AHU-BNW2**)

- A. System Off - When the system is off:
 - 1. The relief air dampers shall be closed.
 - 2. The outside air dampers shall be closed.
 - 3. The return air dampers shall be open.
 - 4. Supply fan shall be off.
 - 5. Chilled water valve shall be closed.
 - 6. Heating water valve shall be closed.
- B. Initiation of System Start-Up - The system shall be started:
 - 1. Manually initiated by operator through BMCS.
 - 2. Automatically by BMCS through occupancy schedule.
- C. System Operation - After system start-up has been initiated the following shall occur:
 - 1. The supply fan shall be enabled.
 - 2. The relief air damper shall modulate to maintain the space static pressure setpoint. The pressure sensor shall compare the pressure difference between the inside and outside. Outside pressure shall be taken near the front door, low on the building, preferably south, or alternatively east or west sides of the building. (AHU-BNW1 and AHU-BNW2 only)
 - 3. Minimum outside air damper shall modulate to maintain the minimum outdoor air flow setpoint.
 - 4. The chilled water valve shall modulate open until the supply air temperature setpoint is satisfied. The chilled water valve shall stay open until the space temperature set point is satisfied. Once the space temperature setpoint is satisfied the chilled water valve shall close.
 - 5. For AHU-2123: The heating water valve shall modulate to maintain a space temperature setpoint. Heating space temperature setpoint shall be 2 Deg. F. (adj.) less than the cooling space temperature setpoint. This shall prevent unnecessary cycling between heating and cooling modes of operation.
 - 6. For AHU-BNW1 and AHU-BNW2 - First stage of heating: The space panel radiator heating water valve shall modulate to maintain the space temperature setpoint. Heating space air temperature setpoint shall be 2 Deg. F. (adj.) less than the cooling space air temperature setpoint. This shall prevent unnecessary cycling between heating and cooling modes of operation.
 - 7. For AHU-BNW1 and AHU-BNW2 - Second stage of heating: If the panel radiator control valve is fully open and a call for heating still exists, modulate the AHU heating water valve to satisfy the room temperature setpoint.
- D. System Shutdown - Shall be initiated as follows:
 - 1. Manually initiated by operator through BMCS.
 - 2. Automatically by BMCS through occupancy schedule.
 - 3. Freezestat trip.
 - 4. High/low static pressure switch trip.
 - 5. Automatically in the event of building power failure or fire alarm.
- E. System Setpoints - The setpoints shall be operator changeable and initially set as follows:
 - 1. Freezestat setpoint shall be 35 degrees F.
 - 2. The time delay for outside air damper control upon AHU startup shall be set at five minutes.

3. The minimum outside air flowrate setpoint shall be as scheduled on the Mechanical Drawings.
4. The return air CO2 limit shall be 500 ppm above the ambient CO2 reading. This is a dynamically controlled setpoint.
5. The space pressure setpoint shall be 0.05 inches w.g.

F. Alarms - The BMCS shall generate an alarm for the following conditions:

1. Fan failure.
2. Freezestat trip.
3. Duct high/low static pressure limit device trip.
4. All alarms shall be inhibited if the supply fan is not in operation. The alarms, except the fan failure to start, shall remain inhibited following start up of the unit for an operator determined period of time initially set at two minutes.

G. Failure Positions - The following shall occur upon component failure or loss of power:

1. Relief air dampers shall close.
2. Outside air dampers shall close.
3. Return air dampers shall open.
4. Chilled water valve shall fail in place.
5. Heating water valve shall fail open.

H. Points List:

1. Software Interface - The following points shall be provided through the BACnet interface. (Typical for each VFC)
 - a. VFC speed reference feedback.
 - b. VFC fault.
 - c. Motor power in HP.
 - d. Motor kWh.
 - e. Motor current.
 - f. Motor voltage.
 - g. Runtime in hours.
 - h. DC link voltage.
 - i. Thermal load on motor.

3.13 VAV AIR HANDLING UNIT (VARIABLE AIR VOLUME SERVING AIR TERMINAL UNITS) **(AHU-BNE1, AHU-3SW1)**

A. System Off - When the system is off:

1. The relief air dampers shall be closed.
2. The outside air dampers shall be closed.
3. The return air dampers shall be open.
4. Supply and return fan shall be off.
5. Chilled water valve shall be closed.
6. Heating water valve shall be closed.
7. Humidifiers shall be off (AHU-3SW1 only).

B. Initiation of System Start-Up - The system shall be started:

1. Manually initiated by operator through BMCS.
2. Automatically by BMCS through occupancy schedule.
3. If AHU serves series fan powered terminal units, they shall be called to start prior to initiating system start-up.

C. System Operation - After system start-up has been initiated the following shall occur:

1. Differential pressure safety switches shall be provided on inlet and outlet sides of supply fans and inlet of return fans, or on supply fan outlet and return fan inlet where fans are in a common housing. Switches shall stop fans and require manual reset.
2. The supply and return fans shall be started at minimum speed. After an operator defined period of time, the fans shall be enabled for automatic speed control.
3. The supply fan speed shall modulate to maintain the supply static pressure setpoint. Pressure sensor shall be located 2/3 of the distance down the system ductwork.
4. The relief air damper shall modulate to maintain the building static pressure setpoint. The building pressure sensor shall compare the pressure difference between the inside and outside. Outside pressure shall be taken near the front door, low on the building, preferably south, or alternatively east or west sides of the building (AHU-BNE1 only).
5. The return fan speed shall modulate to maintain the return air plenum static pressure setpoint. This sensor shall be located in the discharge plenum of the return fan before the return air damper (AHU-BNE1 only).
6. Minimum outside air damper shall modulate to maintain the minimum outdoor air flow setpoint.
7. The chilled water valve shall modulate to maintain a supply air temperature set point as calculated based on deviation from set point.
8. The AHU heating water valve shall modulate to maintain a supply air temperature set point as calculated based on deviation from set point. Heating supply air temperature setpoint shall be 2 Deg. F. (adj.) less than the cooling supply air temperature setpoint. This shall prevent unnecessary cycling between heating and cooling modes of operation.
9. For AHU-BNE1 - Upon a call for heating follow the Air Terminal Unit Single-Duct Variable Volume with Heat sequence of control.
10. For AHU-3SW1 - First stage of heating: The air terminal unit shall go to minimum flow and the air terminal unit heating water valve shall modulate to provide neutral supply air to the space. The space finned tube heating water valve shall modulate to maintain the space temperature setpoint. Heating space air temperature setpoint shall be 2 Deg. F. (adj.) less than the cooling space air temperature setpoint. This shall prevent unnecessary cycling between heating and cooling modes of operation.
11. For AHU-3SW1 - Second stage of heating: If the space finned tube control valve is fully open and a call for heating still exists, modulate the terminal unit heating water valve to satisfy the room temperature sensor.
12. The humidifiers shall modulate to maintain their respective space humidity setpoint. Provide a discharge humidity sensor to prevent high limit operation. (AHU-3SW1 only)
13. The humidifiers shall modulate to maintain their respective space return air humidity setpoint which is reset directly with the room glass surface temperature in order to keep the room dew point temperature above the room glass surface temperature to prevent condensation from forming on the windows. Provide a discharge humidity sensor to prevent high limit operation. (AHU-3SW1 only)

D. System Shutdown - Shall be initiated as follows:

1. Manually initiated by operator through BMCS.
2. Automatically through occupancy schedule.
3. Freezestat trip.
4. High/low static pressure switch trip.
5. Automatically in the event of building power failure or fire alarm.

E. System Setpoints - The setpoints shall be operator changeable and initially set as follows:

1. Return fan return air plenum pressure setpoint shall be set by the balancing contractor, but initially set at 0.1 inches w.g.
2. Freezestat setpoint shall be 35 degrees F.
3. Supply air duct static pressure high limit set at 3.5 inches w.g.
4. Return air duct static pressure low limit device set at -3.5 inches w.g.

5. The minimum and maximum speed signal positions shall be set by the Balancing Contractor within the fan manufacturer's limitations.
6. The time delay for outside air damper control upon AHU startup shall be set at five minutes.
7. The minimum outside air flowrate setpoint shall be as scheduled on the Mechanical Drawings.
8. The return air CO2 limit shall be 500 ppm above the ambient CO2 reading. This is a dynamically controlled setpoint.
9. The space pressure setpoint shall be 0.05 inches w.g.

F. Alarms - The BMCS shall generate an alarm for the following conditions:

1. Fan failure,
2. If the supply air temperature is more than 2 degrees F above/below setpoint.
3. If the supply air static pressure is more than 0.5 inches w.g. above/below setpoint for a period of more than 5 minutes.
4. Freezestat trip.
5. Duct high/low static pressure limit device trip.
6. All alarms shall be inhibited if the supply/return fans are not in operation. The alarms, except the fan failure to start, shall remain inhibited following start up of the unit for an operator determined period of time initially set at two minutes.

G. Failure Positions - The following shall occur upon component failure or loss of power:

1. Failure Positions - The following shall occur upon component failure or loss of power:
2. Relief air dampers shall close.
3. Outside air dampers shall close.
4. Return air dampers shall open.
5. The supply and return fan shall remain in the last commanded state and the speed signal shall go to the minimum speed.
6. Chilled water valve shall fail in place.
7. Heating water valve shall fail open.
8. Heating water valve shall fail in place.
9. Humidifiers shall be off (AHU-3SW1 only).

H. Points List:

1. Software Interface - The following points shall be provided through the BACnet interface. (Typical for each VFC)
 - a. VFC speed reference feedback.
 - b. VFC fault.
 - c. Motor power in HP.
 - d. Motor kWh.
 - e. Motor current.
 - f. Motor voltage.
 - g. Runtime in hours.
 - h. DC link voltage.
 - i. Thermal load on motor.

3.14 ENERGY RECOVERY UNIT (VARIABLE VOLUME, CONDITIONED OUTDOOR AIR (COA))
(ERU-3SW1)

A. System Off - When the system is off:

1. The exhaust air dampers shall be closed.
2. The outside air dampers shall be closed.
3. Supply and exhaust fan shall be off.

4. Energy recovery wheel shall stop.
 5. Dehumidification system shall stop.
 6. Chilled water valve shall be closed.
 7. Heating water valve shall be closed.
- B. Initiation of System Start-Up - The system shall be started:
1. Manually initiated by operator through BMCS.
 2. Automatically by BMCS through occupancy schedule.
- C. System Operation - After system start-up has been initiated the following shall occur:
1. The supply and exhaust fans shall be started at minimum speed. After an operator defined period of time, the fans shall be enabled for automatic speed control.
 2. The supply fan speed shall modulate to maintain the supply static pressure setpoint. Pressure sensor shall be located 2/3 of the distance down the system ductwork.
 3. The exhaust fan speed shall modulate to maintain the exhaust static pressure setpoint. Pressure sensor shall be located 2/3 of the distance down the system ductwork.
 4. The energy recovery/heating/cooling/dehumidification systems shall operate in sequence to maintain a supply air temperature and humidity set point.
- D. System Shutdown - Shall be initiated as follows:
1. Manually initiated by operator through BMCS.
 2. Automatically through occupancy schedule.
 3. High/low static pressure switch trip.
 4. Automatically in the event of building power failure or fire alarm.
- E. System Setpoints - The setpoints shall be operator changeable and initially set as follows:
1. Supply air humidity setpoint shall be 50% RH.
 2. Freezestat setpoint shall be 35 degrees F.
 3. The minimum and maximum speed signal positions shall be set by the Balancing Contractor within the fan manufacturer's limitations.
- F. Alarms - The BMCS shall generate an alarm for the following conditions:
1. Supply fan failure
 2. Exhaust fan failure
 3. Energy recovery device failure
 4. Heating system failure
 5. Cooling system failure
 6. If the discharge/supply air temperature is more than 2 degrees F above/below setpoint.
 7. If the discharge/supply air humidity is more than 5% above setpoint.
 8. If the discharge/supply air static pressure is more than 0.5 inches w.g. above/below setpoint for a period of more than 5 minutes.
 9. Freezestat trip.
 10. Duct high/low static pressure limit device trip.
 11. All alarms shall be inhibited if the supply/exhaust fans are not in operation. The alarms, except the fan failure to start, shall remain inhibited following start up of the unit for an operator determined period of time initially set at two minutes.
- G. Failure Positions - The following shall occur upon component failure or loss of power:
1. Failure Positions - The following shall occur upon component failure or loss of power:
 2. Exhaust air dampers shall close.
 3. Outside air dampers shall close.
 4. The supply and exhaust fan shall remain in the last commanded state and the speed signal shall go to the minimum speed.
 5. Cooling system shall be off.

6. Heating system shall be off.
7. Energy recovery device shall be off.

H. Points List:

1. Software Interface - The following points shall be provided through the BACnet interface.
(Typical for each VFC)
 - a. VFC speed reference feedback.
 - b. VFC fault.
 - c. Motor power in HP.
 - d. Motor kWh.
 - e. Motor current.
 - f. Motor voltage.
 - g. Runtime in hours.
 - h. DC link voltage.
 - i. Thermal load on motor.

3.15 KITCHEN MAKEUP UNIT/SYSTEM (**MAU-1, EF-3SW1 & 2**)

- A. System Off - When the system is off:
 1. The supply fan shall be off.
 2. The outside air damper shall be closed.
 3. The heating water valve shall modulate to maintain the coil inlet temperature setpoint when the outside air temperature is less than 40 degrees F.
 4. The two respective remote kitchen hood exhaust fans shall be off.
- B. Initiation of System Start-Up - The system shall be started:
 1. Manually initiated by operator through BMCS.
 2. Automatically whenever the kitchen exhaust fan is started.
- C. System Operation - After system start-up has been initiated the following shall occur:
 1. The outside air damper shall open.
 2. The supply fan shall start.
 3. The supply fan speed shall increase to provide the design supply airflow when the second kitchen hood exhaust fan is started. The supply fan speed and associated VFC Hz for all combinations of kitchen hood exhaust fans on and off shall be set in the BMCS in coordination with the balancer.
 4. The heating water valve shall modulate to maintain the space heating temperature setpoint.
- D. System Shutdown - Shall be initiated as follows:
 1. Manually initiated by operator through BMCS.
 2. Automatically when both of the kitchen hood exhaust fans are off.
- E. System Setpoints - The setpoints shall be operator changeable and initially set as follows:
 1. Discharge air temperature setpoint shall be 70 degrees F.
- F. Alarms - The BMCS shall generate an alarm for the following conditions:
 1. Fan failure.
- G. Failure Positions - The following shall occur upon component failure or loss of power:
 1. The supply fan shall remain in the last commanded state.
 2. Heating water valve shall fail open.

- H. Points List:
1. Software Interface - The following points shall be provided through the BACnet interface.
(Typical for each VFC)
 - a. VFC speed reference feedback.
 - b. VFC fault.
 - c. Motor power in HP.
 - d. Motor kWh.
 - e. Motor current.
 - f. Motor voltage.
 - g. Runtime in hours.
 - h. DC link voltage.
 - i. Thermal load on motor.

3.16 FAN COIL UNITS (**FCU-6, FCU-8-1, FCU-8-2, FCU-40**)

- A. System Off - When the system is off:
1. The supply fan shall be off.
 2. The chilled water valve shall be closed.
- B. Initiation of System Start-Up - The system shall be started:
1. Manually initiated by operator through BMCS.
 2. Automatically by BMCS through occupancy schedule.
- C. System Operation - After system start-up has been initiated the following shall occur:
1. The supply fan shall start.
 2. The chilled water valve shall modulate to maintain a supply air temperature set point as calculated based on deviation from set point.
 3. The occupant shall have the capability to adjust the space temperature setpoint through the space temperature sensor. The programming shall limit user adjustment to + or - 4 degrees F of the base setpoint.
- D. System Shutdown - Shall be initiated as follows:
1. Manually initiated by operator through BMCS.
 2. Automatically by BMCS through occupancy schedule.
- E. System Setpoints - The setpoints shall be operator changeable and initially set as follows:
1. Space cooling temperature setpoint shall be 74 degrees F.
 2. The high and low temperature alarm setpoints shall be set initially at 3 degrees F above/below the temperature setpoints.
- F. Alarms - The BMCS shall generate an alarm for the following conditions:
1. High temperature.
 2. Low temperature.
- G. Failure Positions - The following shall occur upon component failure or loss of power:
1. The supply fan shall remain in the last commanded state.
 2. Chilled water valve shall fail in place.

3.17 GEOTHERMAL VAULT VENTILATION (AT 17TH AND K)

- A. Exhaust fan control: HOA with switch at manhole for turning on EF when Manhole lid is opened; auto is to run EF when inside humidity is above setpoint, (60% adjustable), AND outside air humidity is less than air in vault. OA temp and humidity should be measured at the Capitol and shared globally so we don't need it measured at vault. Monitor EF run status.
- B. System off - when system is off:
 - 1. The exhaust fan shall be off.
- C. Initiation of System Startup:
 - 1. Manually initiated by BMCS operator workstation.
 - 2. Automatically by the BMCS based on a time schedule.
- D. System operation - after startup has been initiated, the following shall occur:
 - 1. Exhaust fan shall start or stop based on space temperature or humidity levels.
- E. System shutdown - shall be initiated as follows:
 - 1. Manually initiated by operator at BMCS workstation.
 - 2. Alarms - the BMCS shall generate an alarm for the following:
 - a. Fan failure.
 - b. Space temperature.
 - c. Space humidity.
- F. Failure position - the following shall occur upon BMCS communication failure.
 - 1. Fan shall remain in last commanded state.

3.18 GEOTHERMAL VAULT SUMP PUMPS (AT 17TH AND K)

- A. The sump pumps shall operate on their own controls independent of the BMCS.
- B. The BMCS shall monitor the on/off status of the sump pumps.
- C. The BMCS shall monitor the high water level switch and generate an alarm when the switch is activated.

3.19 EXHAUST FANS (EF-3SW3, EF-3SW4)

- A. Exhaust fans shall operate continuously to provide vault room exhaust and code-required bathroom exhaust. Fan shall be disabled based on a schedule.
- B. System off - when system is off:
 - 1. The exhaust fan shall be off.
- C. Initiation of System Startup:
 - 1. Manually initiated by BMCS operator workstation.
 - 2. Automatically by the BMCS based on a time schedule.
- D. System operation - after startup has been initiated, the following shall occur:
 - 1. Exhaust fan shall start.

- E. System shutdown - shall be initiated as follows:
 - 1. Manually initiated by operator at BMCS workstation.
 - 2. Automatically by BMCS through occupancy schedule.
- F. Alarms - the BMCS shall generate an alarm for the following:
 - 1. Fan failure.
- G. Failure position - the following shall occur upon BMCS communication failure.
 - 1. Fan shall remain in last commanded state.

3.20 UNIT HEATER CONTROL BMCS

- A. System Off - When the system is off:
 - 1. The fan shall be off.
 - 2. The heating water valve shall be closed.
- B. Initiation of System Start-Up - The system shall be started:
 - 1. Manually initiated by operator through BMCS.
 - 2. Automatically whenever the space temperature falls below the space temperature heating setpoint.
- C. System Operation - After system start-up has been initiated the following shall occur:
 - 1. The fan shall start.
 - 2. The heating water valve shall open to satisfy the space temperature heating setpoint.
 - 3. Once the space temperature heating setpoint is satisfied, the heating water valve shall close and the fan shall stop.
- D. System Shutdown - Shall be initiated as follows:
 - 1. Manually initiated by operator through BMCS.
 - 2. Automatically whenever the space temperature rises above the space temperature heating setpoint.
- E. System Setpoints - The setpoints shall be operator changeable and initially set as follows:
 - 1. Space heating temperature setpoint shall be 70 degrees F.
 - 2. The low temperature alarm setpoint shall be set initially at 5 degrees F above/below the temperature setpoints.
- F. Alarms - The BMCS shall generate an alarm for the following conditions:
 - 1. Fan failure.
 - 2. Low space temperature.
- G. Failure Positions - The following shall occur upon component failure or loss of power:
 - 1. Heating water valve shall fail open.

3.21 CO2 DEMAND VENTILATION - SPACE OR RETURN AIR FLOW SENSORS WITH VARIABLE OCCUPANCY:

- A. By monitoring CO2 levels, either by return air or space CO2 sensors, the AHU or conditioned outdoor air, COA (**ERU-3SW1**), outside air flow can be reduced and only opened when the CO2 levels rise above desired levels.

1. When CO2 rises above high limit 800 ppm (adj.) minimum outdoor air damper minimum position can be increased from a starting level X cfm (adj.) by 100 cfm (adj.) every 15 min (adj.) to a maximum outside air of Y cfm (adj.) until CO2 levels are below the high level.
2. When CO2 rises above high limit 800 ppm (adj.) supply COA terminal unit damper minimum position can be increased from a starting level X cfm (adj.) by 100 cfm (adj.) every 15 min (adj.) to a maximum outside air of Y cfm (adj.) until CO2 levels are below the high level.
 - a. Respective exhaust terminal unit airflow setpoints shall track the supply COA airflows to maintain a consistent offset.
 - b. Reference terminal unit schedules for seasonal maximum airflow setpoints for COA TUs.
3. Dampers will remain at calculated flow rate until CO2 levels are below the deadband of 100 ppm to 700 ppm (adj.)
4. When below low level setpoint the outside air minimum air flow setpoint will be decreased by 100 cfm (adj.) every 15 min (adj.) until outside air or terminal unit damper is closed or at starting minimum air flow.

3.22 HUMIDIFIERS

A. Ultrasonic:

1. When supply fan is running air flow switch proves air flow and humidifier shall operate to maintain the space humidity setpoint at the humidistat located in the space or return air humidity sensor in the return air ductwork (see plans for locations). Reset the space humidity setpoint directly with the room glass surface temperature in order to keep the room dew point temperature above the room glass surface temperature to prevent condensation from forming on the single pane windows. Provide for slow humidifier response to a call for humidity to help avoid over-humidifying the space as the outdoor air drops to colder night-time temps. Set room glass surface temperature reset schedule to 40 percent relative humidity at 70 degrees F (adjustable) and 4 percent relative humidity at 0 degrees F (adjustable).

3.23 STAGED CONTROL OF ROOMS WITH PANEL RADIATORS AND VRF FAN COIL HEATING

- A. First stage of heating: Single temperature room temperature sensor set at 74 degrees F maintains constant space temperature by modulating two-way control heating valve for the panel radiators.
- B. Second stage of heating: If the panel radiators control valve is fully open and a call for heating still exists, enable the VRF fan coil serving the room to operate and satisfy the room temperature sensor.

3.24 STEAM RADIATOR CONTROL FOR SECOND FLOOR HALLS OF FAME (CORRIDOR SW-CTYDC-2 AND CORRIDOR NW-CTYDC-2)

- A. On a call for heating, the steam valve shall open in the basement for the respective Hall of Fame. The valve shall stay open until the space temperature sensor is satisfied 72 degrees F (adjustable) at which time the steam control valve shall close.

3.25 VRF VARIABLE EVAPORATOR TEMPERATURE (VET) CONTROL

- A. The VRF water source heat pumps and heat recovery units have a self-contained VET control sequence which shall be disabled by the BMCS when the outside air dew point is above 50 degrees F (adjustable). The VET sequence shall be re-enabled by the BMCS when the outside air dew point is 48 degrees F (adjustable) or lower.

3.26 ADDITIONAL ENERGY MANAGEMENT STRATEGIES

- A. Energy management strategies shall be applied to specific equipment control sequences as indicated.
- B. Critical zone reset: AHU Duct Static Pressure:
 - 1. Simple strategy - Vary the duct static pressure based on the demand in the VAV system.
 - 2. Detailed explanation - Upon start up the duct static pressure will be 1.0 "wc (adj.).
 - a. When a terminal unit damper position is 95% (adj.) or greater, the duct static pressure will be increased by 0.1 "wc (adj.) every 15 min. (adj.) until terminal units are below 95% or the maximum static pressure set point of 2.0 "wc (adj.) is reached.
 - b. If no boxes are above 65% (adj.) the duct static pressure setpoint will decreased by 0.1 "wc (adj.) every 15 min or until the minimum static pressure set point of 0.8 "wc (adj.) is reached.
- C. Critical zone reset: AHU Discharge air setpoint reset:
 - 1. Simple strategy - Vary the discharge air setpoint based on VAV demand.
 - 2. Detailed explanation - Upon start up the supply set point will be 57 deg (adj.).
 - a. When a terminal unit damper position is 95% (adj.) or greater, the supply air temperature set point will be decreased by 0.5 deg(adj.) every 15 min. (adj.) until terminal units are below 95% or the minimum supply set point of 53 deg (adj.) is reached.
 - b. If no boxes are above 65% (adj.) the supply setpoint will decreased by 0.5 deg (adj.) every 15 min or until the maximum supply set point of 62 deg (adj.) is reached.
 - c. The maximum set point is subject to environment and may need to be lower with respect to humidity. An override set point based on return humidity is an option.
- D. Water System: System differential pressure set point reset. Variable flow system:
 - 1. Simple strategy - Vary chilled water system differential pressure set point based on demand of the chilled water valves.
 - 2. Detailed explanation - By monitoring water valves in a variable flow system, capacity can be approximated.
 - a. System differential pressure shall start at a set point of 20 psi. (adj.). If any valve is open to 80% (adj.) the system pressure set point can be increased by an increment of 2 psi. (adj.) every 10 minutes (adj.) until a maximum pressure set point of 30 psi. (adj.) is achieved or no valve is above 80 %. If no valves are open to 50% (adj) or greater, the system differential pressure set point can be decreased by an increment of 2 psi. (adj.) every 10 minutes (adj.) unit a minimum pressure set point of 10 psi. (adj.) is reached. If all the valves are between 50 and 80% no changes will be made.
- E. Continuous Commissioning of BMCS:

1. Simple strategy - Use energy usage information to further tune building to trim energy usage.
 2. Detailed explanation - In many instances, when a energy management system is sold, it is designed and specified, but without third party commissioning it is unlikely that it is installed and programmed per the specification.
 - a. A base line of energy usage should be collected from energy provider, or by onsite equipment.
 - b. A review of energy usage should be done four times a year minimum.
 - c. If a commissioning authority is to commission the building, these usage values are valuable.
 - d. After site review and commissioning the building to original design specifications, reviewing of usage at this point will provide an idea to implement more complex sequences of operation to limit energy usage.
- F. Zone space temperature offset (**applies to non-VRF systems**):
1. Unoccupied seasonal temperature control.
 - a. Simple strategy - While setting back temperatures during unoccupied periods can save money, setting back too far can cause greater recovery costs during some conditions.
 - 1) Detailed explanation - By raising/lowering unoccupied temperature setpoints in increments the building impact can be less than trying to recover the building all at once in an optimal or regular start sequence.
- G. Zone space temperature offset (**applies to non-VRF systems**):
1. Unoccupied weekend temperature control.
 - a. Simple strategy - Changing setback amount when unoccupied for longer periods.
 - 1) Detailed explanation - During the weekend period the unoccupied heating/cooling setpoints can be more significant because of prolonged unoccupied periods.
 - (a) Day before full occupancy unoccupied set points can be incremented to lessen occupancy impact.

END OF SECTION

SECTION 238200 - CONVECTION HEATING AND COOLING UNITS

PART 1 GENERAL

1.1 ADMONITION

- A. The United States Department of the Interior has recognized the Nebraska State Capitol as a registered National Historic Landmark (NHL) possessing exceptional architectural, historic and cultural value for our nation. Original building and site details, finishes and furnishings are of the highest quality available, both in terms of material and craftsmanship. It is the mission of the Office of the Capitol Commission to insure that the work performed under construction and service contracts be of a quality equal or superior to the original construction. Only qualified, experienced contractors/craftsmen who recognize the exceptional value of this landmark and can perform to the highest standards will be employed.

1.2 SECTION INCLUDES

- A. Hydronic panel radiators.
- B. Hydronic finned tube.
- C. Hydronic unit heaters.
- D. Hydronic fan-coil units.

1.3 REFERENCE STANDARDS

- A. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI).
- B. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.

1.4 SUBMITTALS

- A. Specification Compliance Review.
- B. Product Data: Provide typical catalog of information including arrangements.
- C. Shop Drawings:
 - 1. Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
 - 2. Indicate air coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.
 - 3. Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output provided.
 - 4. Submit the following for fan coil units indicating:
 - a. Overall dimensions including installation, operation, and service clearances.
 - b. Lift points, recommendations, and center of gravity.

- c. Unit shopping, installation, and operating weights including dimensions.
 - d. Fan curves with specified operating point clearly plotted.
 - e. Safety and start-up instructions.
 - 5. Indicate mechanical and electrical service locations and requirements.
 - D. Certificates: Certify that coils are tested and rated in accordance with AHRI 410. Coil capacities, pressure drops, and selection procedures meet or exceed specified requirements.
 - E. Manufacturer's Instructions: Indicate installation instructions and recommendations.
 - F. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access or valving.
 - G. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.
 - H. Warranty: Submit manufacturer's warranty and ensure forms have been completed in OCC's name and registered with manufacturer.
 - I. Maintenance Materials: Furnish the following for OCC's use in maintenance of project.
 - 1. Extra Filters: One set of each type and size.
- 1.5 QUALITY ASSURANCE
- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
 - B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 PERFORMANCE, CAPACITIES AND CHARACTERISTICS

- A. See Drawings for Equipment Schedules with Equipment Performance Requirements when capacities and characteristics are not indicated in the specifications.

2.2 HYDRONIC PANEL RADIATORS

- A. Manufacturers:
 - 1. Sigma
 - 2. Runtal Radiators
- B. Perform factory run test under normal operating conditions, water, and steam flow rates.
- C. Heating Elements: Single or multiple, steel panel radiator elements, one-piece construction, consisting of flattened water tubes welded to headers at each end.
 - 1. Specific details as indicated.
 - 2. The radiator's headers shall include all necessary inlet, outlet and vent connections as required.

3. Standard connection sizes are 1/2" NPT tapered thread for supply and return piping, and 1/8" for the vent connection.
 4. Internal baffling is provided where required for proper water flow.
 5. The panel radiation shall be capable of being mounted to typical stud wall construction without additional blocking or strapping.
 6. Wall mounting brackets or floor post mounting shall be provided with the radiation as indicated.
 7. Panel radiation expansion shall not exceed 1/64" per foot of radiation at 215°F.
 8. Finishes:
 - a. The panel radiation shall be cleaned and phosphatized in preparation for the powder coat finish. The radiation is then finish painted with a gloss powder coat finish, for a total paint thickness of 2-3 mils .
- D. Enclosure:
1. Steel material with high back and top, of one piece construction.
 2. Removable front panel, end panel, end caps, corners, and joiner pieces.
 3. Full length control damper.
 4. Provisions for return piping.
- E. Finish:
1. Factory applied, baked enamel finish.
 2. Color: As selected from color chart.
- F. Element Brackets: Galvanized or pre-painted steel supported from panel with non-metal element cradles or shoes, that allow for noise free expansion and contraction.

2.3 HYDRONIC FINNED TUBE

- A. Manufacturers:
1. Modine Manufacturing Company: www.modineHVAC.com.
 2. Slant/Fin Corporation: www.slantfin.com.
 3. Daikin .
 4. Rosemex.
 5. Sigma.
 6. Sterling.
 7. Vulcan.
 8. Zehnder Rittling.: www.rittling.com
- B. Required Directory Listing: AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); current edition at www.ahrinet.org.
- C. Heating Elements: 3/4 inch ID seamless copper tubing, mechanically expanded into evenly spaced aluminum fins sized 4 by 4 inches, suitable for soldered fittings.
1. Minimum Coil Wall Thickness: 0.015 inch
 2. Minimum Working Pressure: 100 psig.
- D. Element Hangers: Quiet operating, ball bearing cradle type providing unrestricted longitudinal movement, on enclosure brackets.
- E. Enclosures: 18 gage, 0.0478 inch sheet steel up to 18 inches in height, 16 gage, 0.0598 inch sheet steel over 18 inches in height or aluminum as detailed, with easily jointed components for wall to wall installation.
1. Support rigidly, on wall or floor mounted brackets at least 3 feet on center maximum.

- F. Finish: Factory applied baked primer coat.
- G. Damper: Where not thermostatically controlled, provide knob-operated internal damper at enclosure air outlet.
- H. Access Doors: For otherwise inaccessible valves, provide factory-made permanently hinged access doors, 6 by 7 inch minimum size, integral with cabinet.

2.4 HYDRONIC UNIT HEATERS

- A. Manufacturers:
 - 1. Modine Manufacturing Company: www.modineHVAC.com.
 - 2. Sterling Hydronics, a Mestek Company: www.sterlingheat.com.
 - 3. Daikin .
 - 4. Sigma
 - 5. Engineered Air Ltd.
 - 6. Rosemex Products.
 - 7. Airtherm; a Mestek Company.
 - 8. Carrier Corporation.
 - 9. Dunham-Bush, Inc.
 - 10. International Environmental Corporation.
 - 11. USA Coil & Air.
 - 12. Vulcan.
 - 13. Williams and Reznor.
 - 14. Zehnder Rittling.: www.rittling.com
- B. Coils: Seamless copper tubing, silver brazed to steel headers, and with evenly spaced aluminum fins mechanically bonded to tubing.
 - 1. Minimum Coil Wall Thickness: 0.015 inch
 - 2. Minimum Working Pressure: 125 psig.
- C. Perform factory run test under normal operating conditions, water, and steam flow rates.
- D. Casing: Minimum 18 gage, 0.0478 inch thick sheet steel casing with threaded pipe connections for hanger rods for horizontal models and minimum 18 gage, 0.0478 inch thick sheet steel top and bottom plates for vertical projection models.
- E. Finish: Factory applied baked primer coat.
- F. Fan: Direct drive propeller type, statically and dynamically balanced, with fan guard; horizontal models with permanently lubricated sleeve bearings; vertical models with grease lubricated ball bearings.
- G. Air Outlet: Adjustable pattern diffuser on vertical projection models and two or four way louvers on horizontal projection models.
- H. Control: Local solid state disconnect switch.

2.5 HYDRONIC FAN COIL UNITS

- A. Manufacturers:
 - 1. Johnson Controls: www.johnsoncontrols.com.

2. Trane, a brand of Ingersoll Rand: www.trane.com.
 3. Daikin Applied: www.daikinapplied.com.
 4. Airtherm; a Mestek Company.
 5. Environmental Technologies, Inc.
 6. International Environmental Corporation.
 7. Rosemex.
 8. Williams.
 9. YORK International Corporation.
- B. Performance Data and Safety Requirements:
1. Coils rated and tested in accordance with AHRI 410.
 2. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to Authority Having Jurisdiction as suitable for the purpose indicated.
 3. Conform to the requirements of NFPA 90A for unit construction, including filters and related equipment, for protection of life and property from fire, smoke, and gases resulting from conditions having manifestations similar to fire.
- C. Unit Casing:
1. Fabricate from heavy gage galvanized steel sheet.
 2. Insulate inside walls with 1 inch thick, fiberglass insulation for thermal and acoustical control.
 3. Provide access panels allowing servicing of coils, drain pan, fan, motor, and drive.
 4. Provide knockouts or hanger rod holes at all four corners for suspended units.
- D. Air Coils:
1. Aluminum fins mechanically expanded or bonded to copper tubes having standard sweat connections.
- E. Fans: Forward curved, centrifugal blower, dynamically balanced, adjustable speed V-belt drive with fan shaft supported by heavy-duty, permanently sealed ball bearings.
- F. Drain Pan: Cleanable, one-piece construction of polymer, galvanized steel, or stainless steel; with drain connection and sloped for positive drainage.
- G. Filters: Fully accessible, flat filter rack with throw-away filters.
- H. Motors: Single speed with sleeve or ball bearings, 1750 rpm, wired to unit junction box, and mounted on a resilient motor base.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are suitable for installation.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's recommendations.
- B. Install equipment exposed to finished areas after walls and ceilings are finished and painted.

- C. Do not damage equipment or finishes.
- D. Panel Radiators:
 - 1. Locate on outside walls unless otherwise indicated.
 - 2. Center elements under window with elements of equal length centered under each window for multiple windows.
- E. Finned Tube:
 - 1. Locate on outside walls and run cover continuously wall-to-wall unless otherwise indicated.
 - 2. Center elements under window with elements of equal length centered under each window for multiple windows.
 - 3. Install wall angles and end caps where units butt against walls.
 - 4. Align cabinet joints with window mullions.
 - 5. Install wall angles where units butt against walls.
- F. Unit Heaters:
 - 1. Hang from building structure, with pipe hangers anchored to building, not from piping or electrical conduit.
 - 2. Mount as high as possible to maintain greatest headroom unless otherwise indicated.
- G. Units with Hydronic Coils:
 - 1. If not easily accessible, extend air vent to exterior surface of cabinet for ease of servicing.
 - 2. Provide float operated automatic air vents with stop valve for fan coil units and unit heaters.
- H. Fan Coil Units:
 - 1. Verify all surfaces and openings at unit location can suitably accommodate unit(s).
 - 2. Install in accordance with manufacturer's recommendations.
 - 3. General piping installation requirements are specified in other Sections and drawings indicate general arrangement of piping, fittings, and specialties.
 - 4. Connect hydronic and condensate drain to unit.

3.3 FIELD QUALITY CONTROL

- A. Provide manufacturer's field representative to test, inspect, instruct, and observe.

3.4 CLEANING

- A. After construction is completed, clean exposed surfaces of units.
- B. Vacuum clean coils and inside of units.
- C. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.
- D. Install new filters.

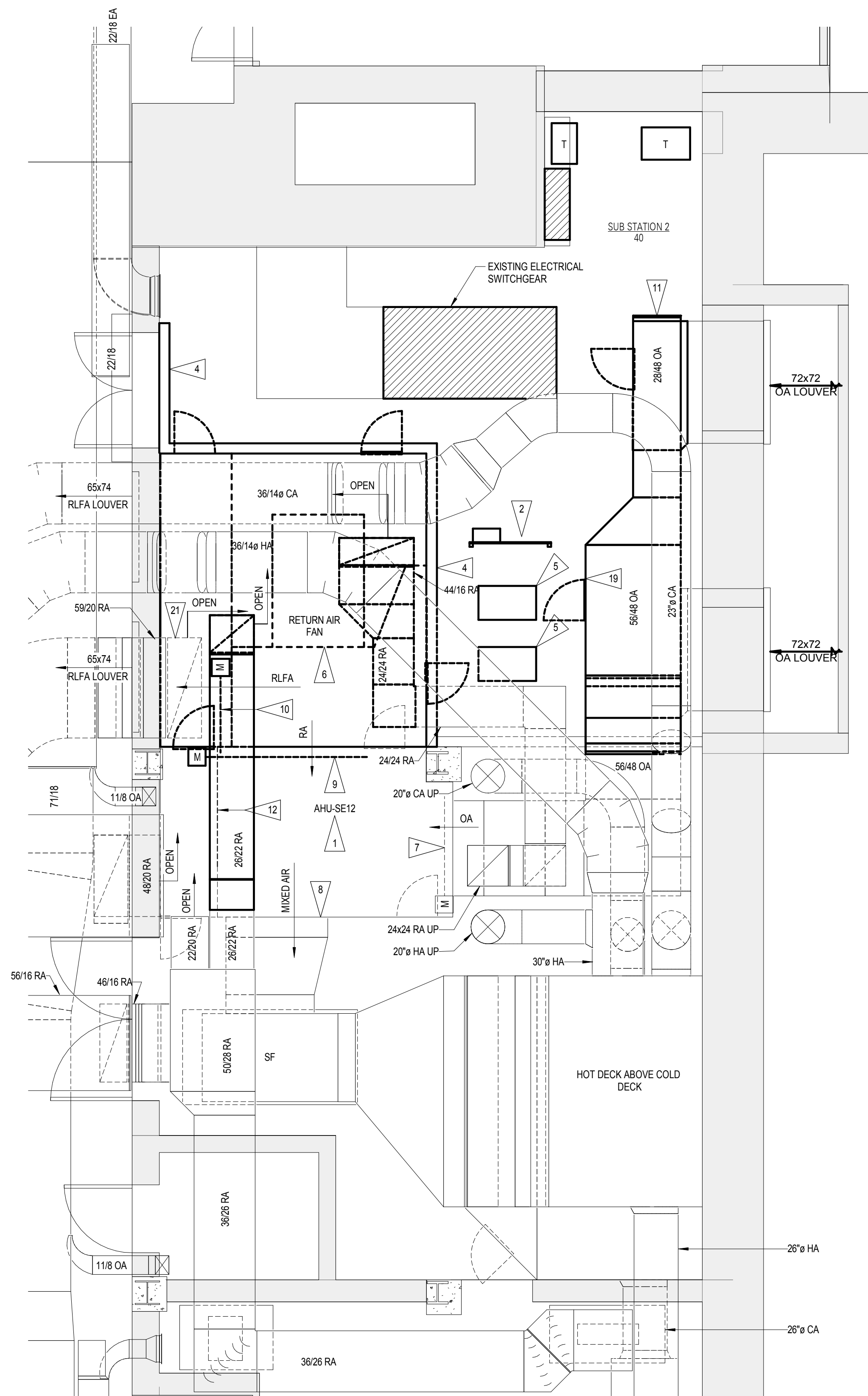
3.5 PROTECTION

- A. Provide finished cabinet units with protective covers during the balance of construction.

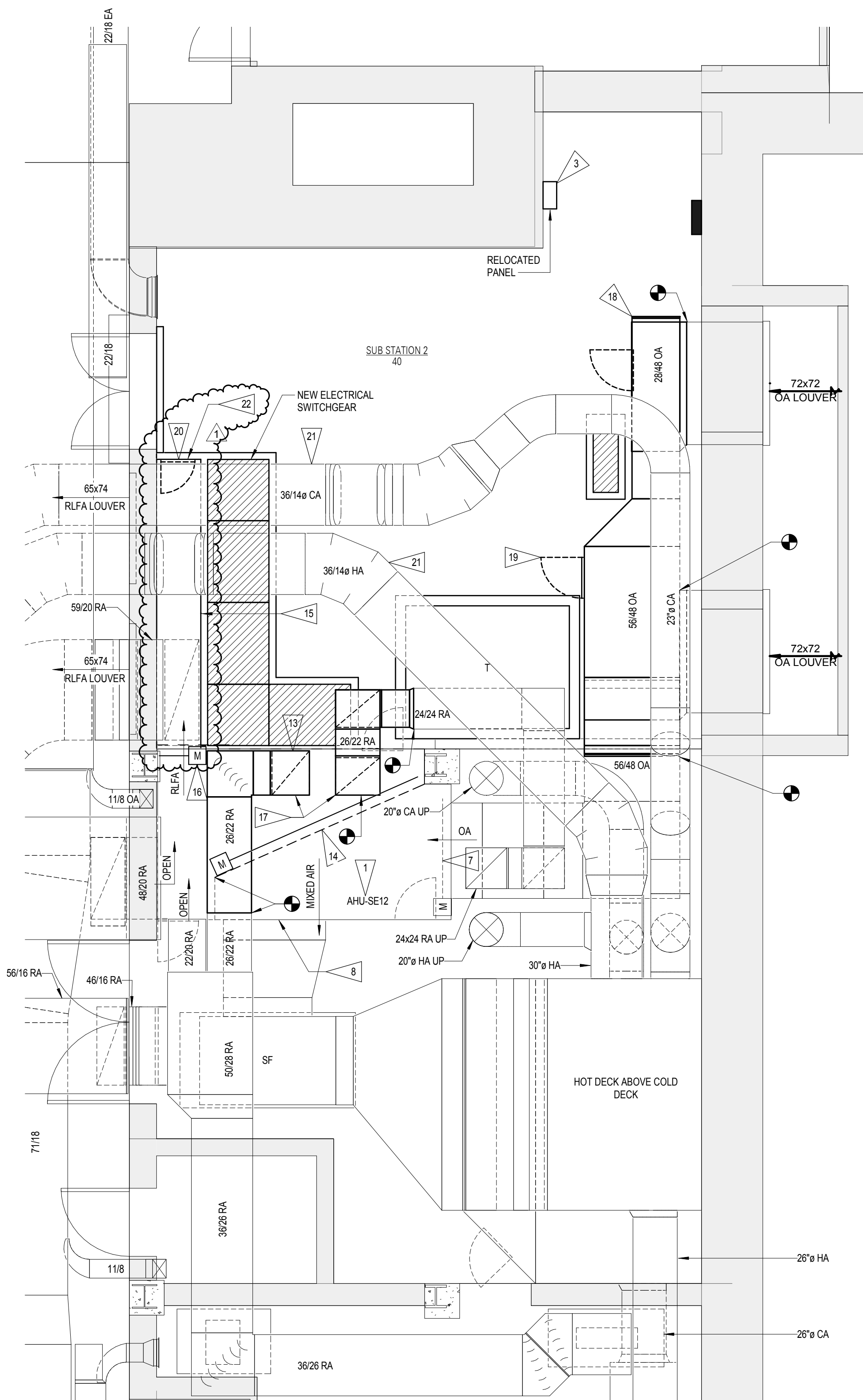
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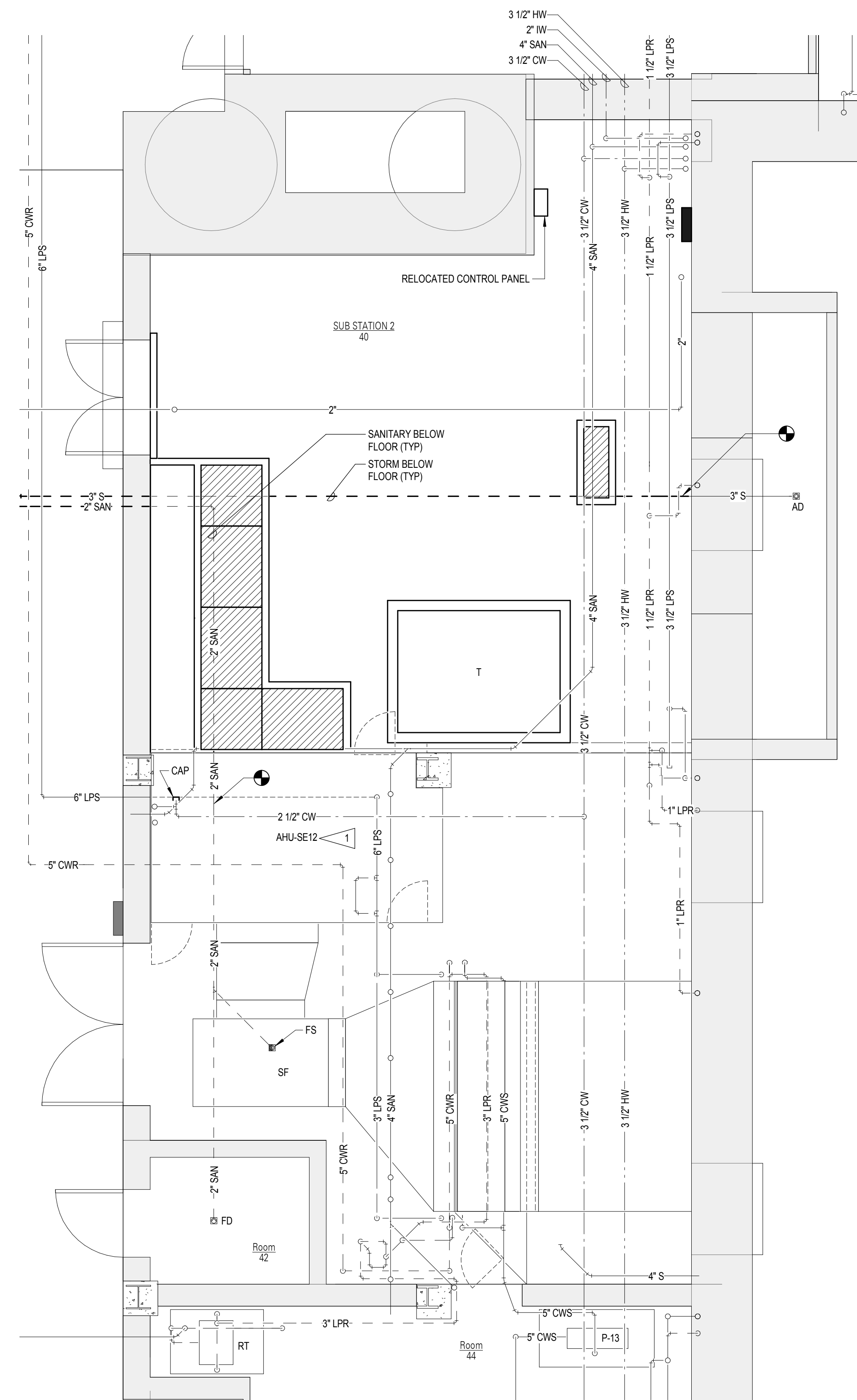
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1 PA PARTIAL ENLARGED SUB STATION 2 FLOOR PLAN - DEMO - HVAC
1/4" = 1'-0"
2' 4' 8' 12' 16' 20'



2 PA PARTIAL ENLARGED SUB STATION 2 FLOOR PLAN - HVAC
1/4" = 1'-0"
2' 4' 8' 12' 16' 20'



3 PA PARTIAL ENLARGED SUB STATION 2 FLOOR PLAN - PIPING
1/4" = 1'-0"
2' 4' 8' 12' 16' 20'

GENERAL NOTES

1. SEE SHEET M0.0 PA FOR ALL GENERAL NOTES.

FLAG NOTES

1. AHU-SE12 SERVES THE COURT OF APPEALS WHICH IS IN PHASE 1 AND THE SUPREME COURT AND LAW LIBRARY WHICH ARE IN PHASE 2. ALL WORK OCCURRING TO THE AHU-SE12 SYSTEM SHALL BE PERFORMED TO MINIMIZE DOWN TIME AS MUCH AS POSSIBLE. COORDINATE THE SCHEDULE OF SHUT DOWN WITH THE OWNER AT LEAST TWO WEEKS IN ADVANCE.
2. EXISTING AHU-SE12 PNEUMATIC/BMCS PANEL TO BE RELOCATED. SEE NEW WORK PLAN FOR LOCATION.
3. REINSTALL THE EXISTING AHU-SE12 PNEUMATIC/BMCS CONTROL PANEL ON A FLOOR MOUNTED UNISTRUT STAND.
4. SEE STRUCTURAL FOR REMOVAL OF CONCRETE CURB.
5. SEE STRUCTURAL FOR REMOVAL OF ABANDONED CONCRETE PAD.
6. REMOVE THE EXISTING RETURN AIR FAN ASSOCIATED FLOOR SET MOTOR. ASSOCIATED AHU CASING AND ACCESS DOORS.
7. EXISTING 60\"/>
8. EXISTING FILTER SECTION TO REMAIN.

9. REMOVE EXISTING 54\"/>
10. REMOVE EXISTING 54\"/>
11. REMOVE EXISTING OUTSIDE AIR DUCTWORK TO ALLOW FOR PLUMBING AND ELECTRICAL FLOOR TRENCHING. RETAIN THE OUTSIDE AIR DUCTWORK FOR REUSE.
12. REMOVE INDICATED PORTION OF SHEET METAL WALL PANEL WHICH SEPARATES THE RETURN AIR FROM THE MIXED AIR AHU SECTIONS.
13. INSTALL NEW UNINSULATED SHEET METAL WALL PANEL CASING IN PLACE OF THE REMOVED RETURN AIR DAMPER. SEE SPECIFICATIONS. SEAL ALL FLOOR, WALL, AND ROOF JOINTS WITH FLASHING AND CAULKING.
14. REINSTALL EXISTING 54\"/>
15. INSTALL NEW SHEET METAL WALL PANEL CASING (ON NORTH AND EAST SIDES) AND ROOF PANEL CASING TO FORM A PLENUM AROUND THE EXISTING RLFA LOUVERS. THE CASING SHALL ENCLOSE AN AREA THAT IS APPROXIMATELY 28' WIDE x 188' LONG x 8' TALL (FIELD VERIFY EXACT SIZE). THE ROOF AND WALL PANEL CASING SHALL BE HEAVY ENOUGH AND REINFORCED ENOUGH TO SUPPORT A PERSON WALKING ON TOP OF THE ROOF. SEAL ALL FLOOR, WALL, AND ROOF JOINTS WITH FLASHING AND CAULKING.
16. INSTALL NEW 22' WIDE x 6' TALL OPPOSED BLADE RLFA DAMPER. INSTALL REUSED PNEUMATIC ACTUATORS TO SERVE THIS DAMPER. INSTALL NEW UNINSULATED SHEET METAL WALL PANEL CASING. SEE SPECIFICATIONS. AROUND THE RLFA DAMPER TO COMPLETE THE SEPARATION OF THE RETURN AIR AND RLFA AHU SECTIONS AS SHOWN. SEAL ALL FLOOR, WALL, AND ROOF JOINTS WITH FLASHING AND CAULKING.
17. INSTALL OPEN RETURN AIR DUCT THRU ROOF OF EXISTING AHU.
18. RE-INSTALL EXISTING OUTSIDE AIR DUCTWORK.
19. REMOVE EXISTING OUTSIDE AIR DUCTWORK ACCESS DOOR AND RE-INSTALL TO BE CLEAR OF THE NEW TRANSFORMER. PATCH THE OUTSIDE AIR DUCTWORK AS NEEDED.
20. INSTALL NEW 22' WIDE x 72' TALL ACCESS DOOR. FIELD VERIFY THE MAX WIDTH. SEE SPECIFICATIONS.
21. EXISTING DUCTWORK TO BE REMOVED IN PHASE 1.
22. INSTALL CONCRETE PAD BELOW NEW RLFA WALL PANEL CASIN. SEE STRUCTURAL.

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NEBRASKA STATE CAPITOL HVAC
REPLACEMENT AND WINDOW
RESTORATION

PROJECT: OCC 2014485
BVH 1.14077
DATE: APRIL 23 2018

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04/23/2018

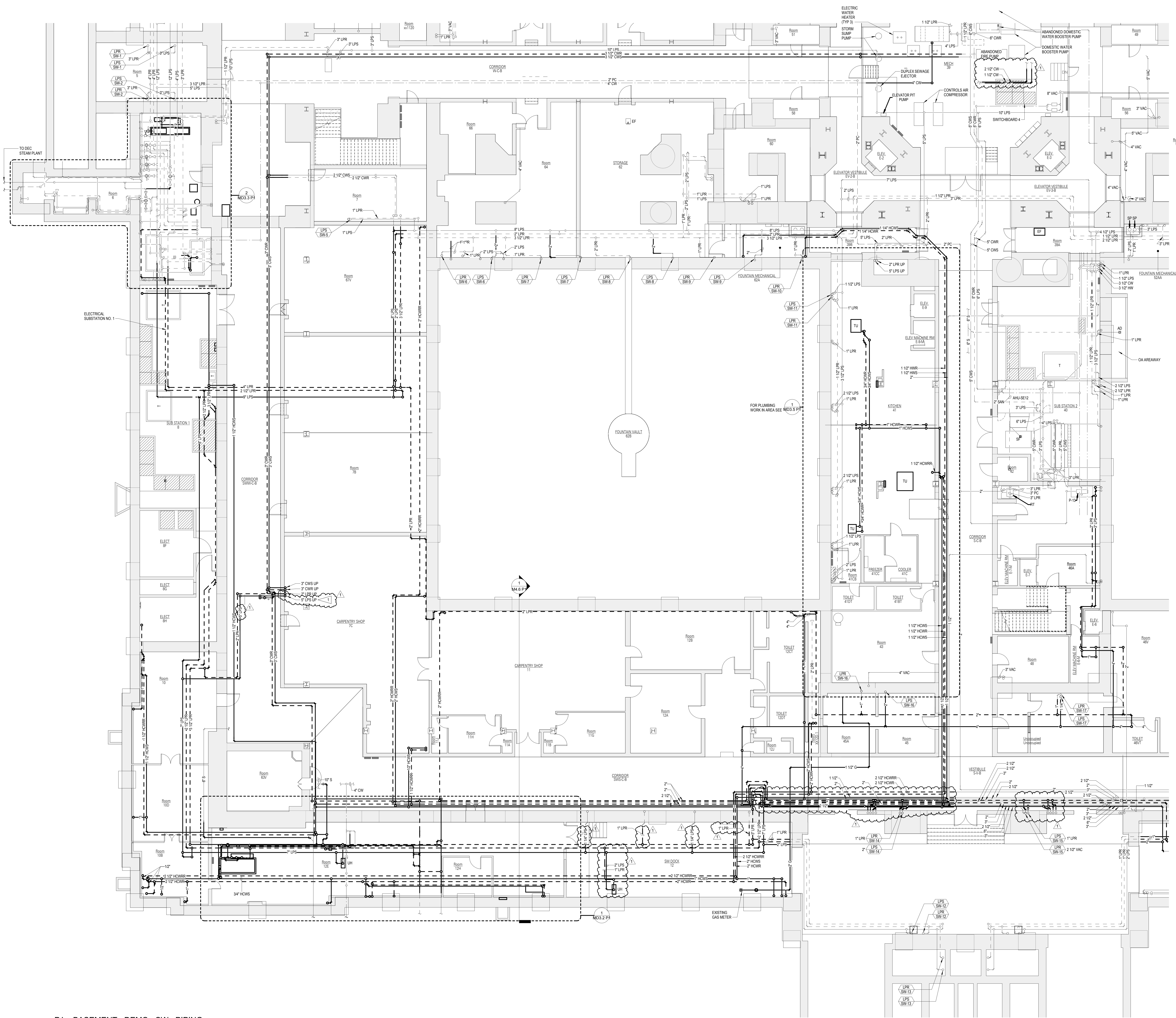
ENLARGED MECHANICAL PLANS

NORTH
1

M3.1
PA

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GENERAL NOTES
1. SEE SHEET MD2.0 P1 FOR ALL GENERAL NOTES.

FLAG NOTES
REMOVE 5" LPS FROM BASEMENT UP TO THIRD FLOOR.

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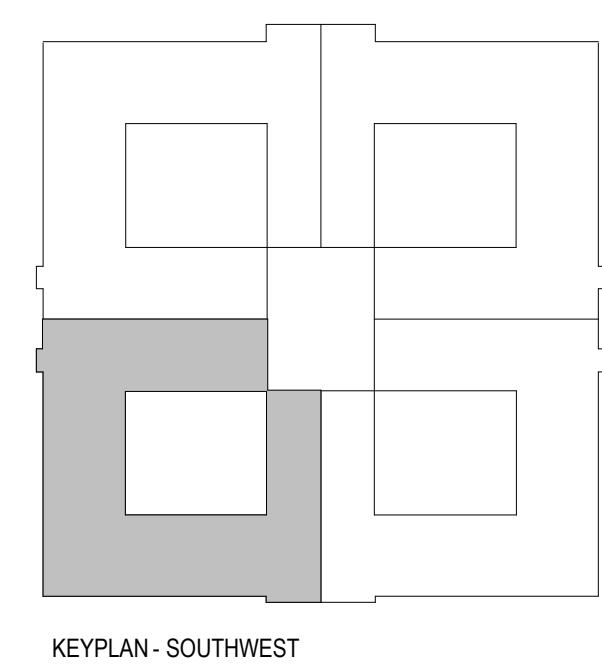
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NEBRASKA STATE CAPITOL HVAC REPLACEMENT AND WINDOW RESTORATION

PROJECT: OCC 2014485 DATE: APRIL 23, 2018

BVH 114077

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MECHANICAL ENGINEER

STEVEN T. ALVINE

E-6219

STATE OF NEBRASKA

04/23/2018

BASEMENT FLOOR DEMO PLAN - SW - PIPING

NORTH

1

MD2.0

P1

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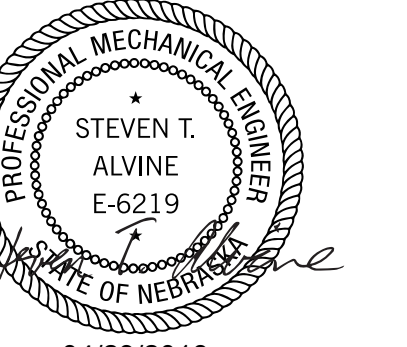
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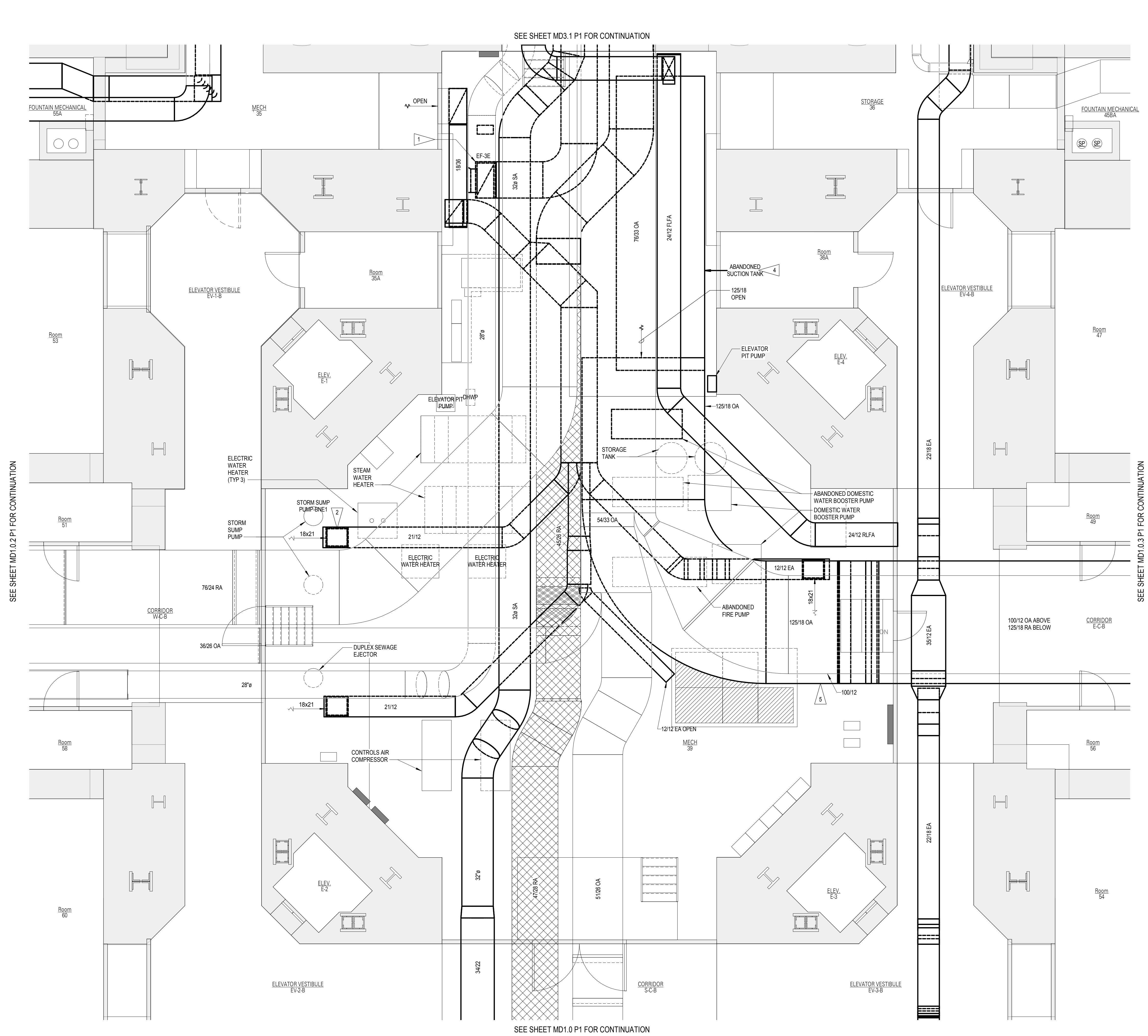
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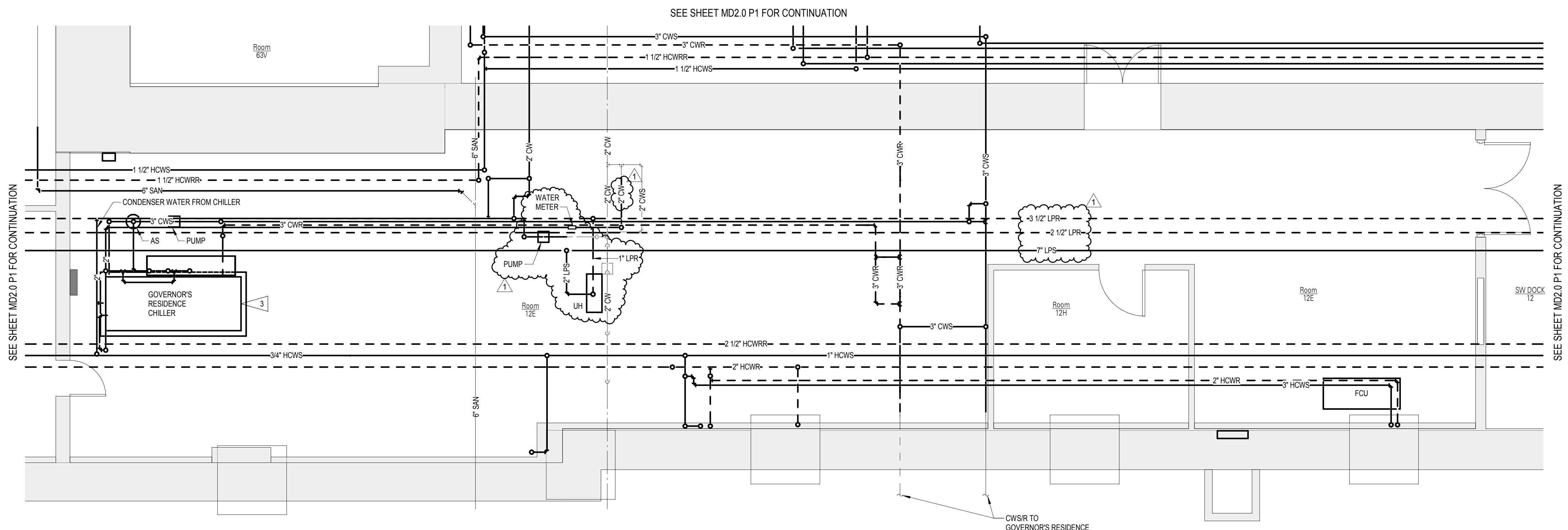
CT: OCC 201405
BVH L14077



LARGED MECHANICAL PLANS

MD3.2
P1

2 P1 PARTIAL ENLARGED MECHANICAL 39 FLOOR PLAN SOUTH - DEMO - HVAC



1 P1 PARTIAL ENLARGED MECHANICAL 12E FLOOR PLAN - DEMO - PIPING

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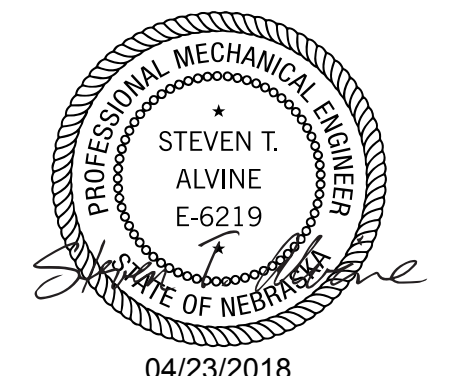
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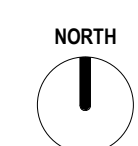
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NEBRASKA STATE CAPITOL HVAC REPLACEMENT AND WINDOW RESTORATION

PROJECT: OCC 2014405 BVH 1.14077 DATE: APRIL 23 2018



ENLARGED MECHANICAL PLANS DEMO



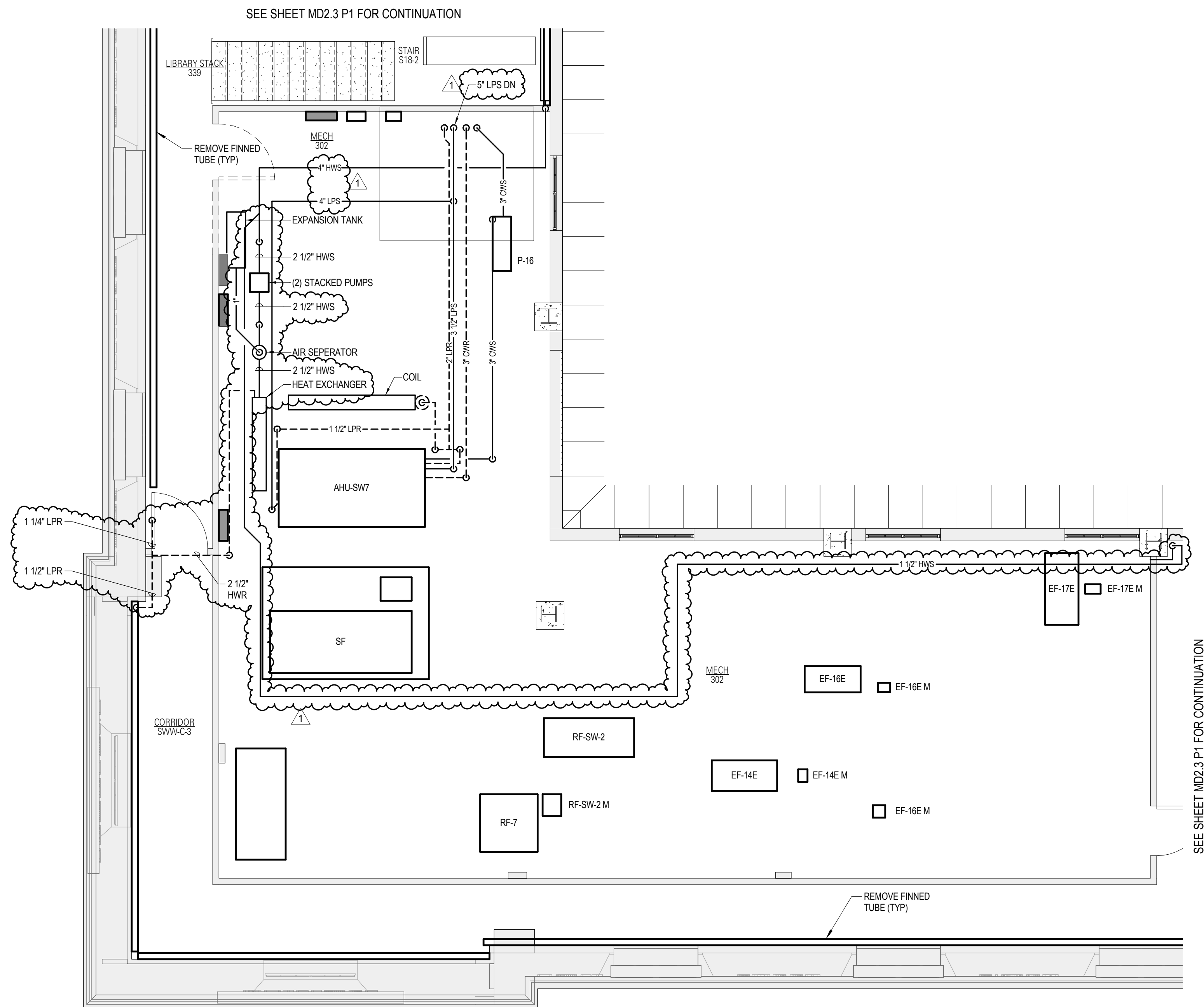
MD3.3
P1

GENERAL NOTES

- SEE SHEET MD.0 P1 FOR ALL GENERAL NOTES.

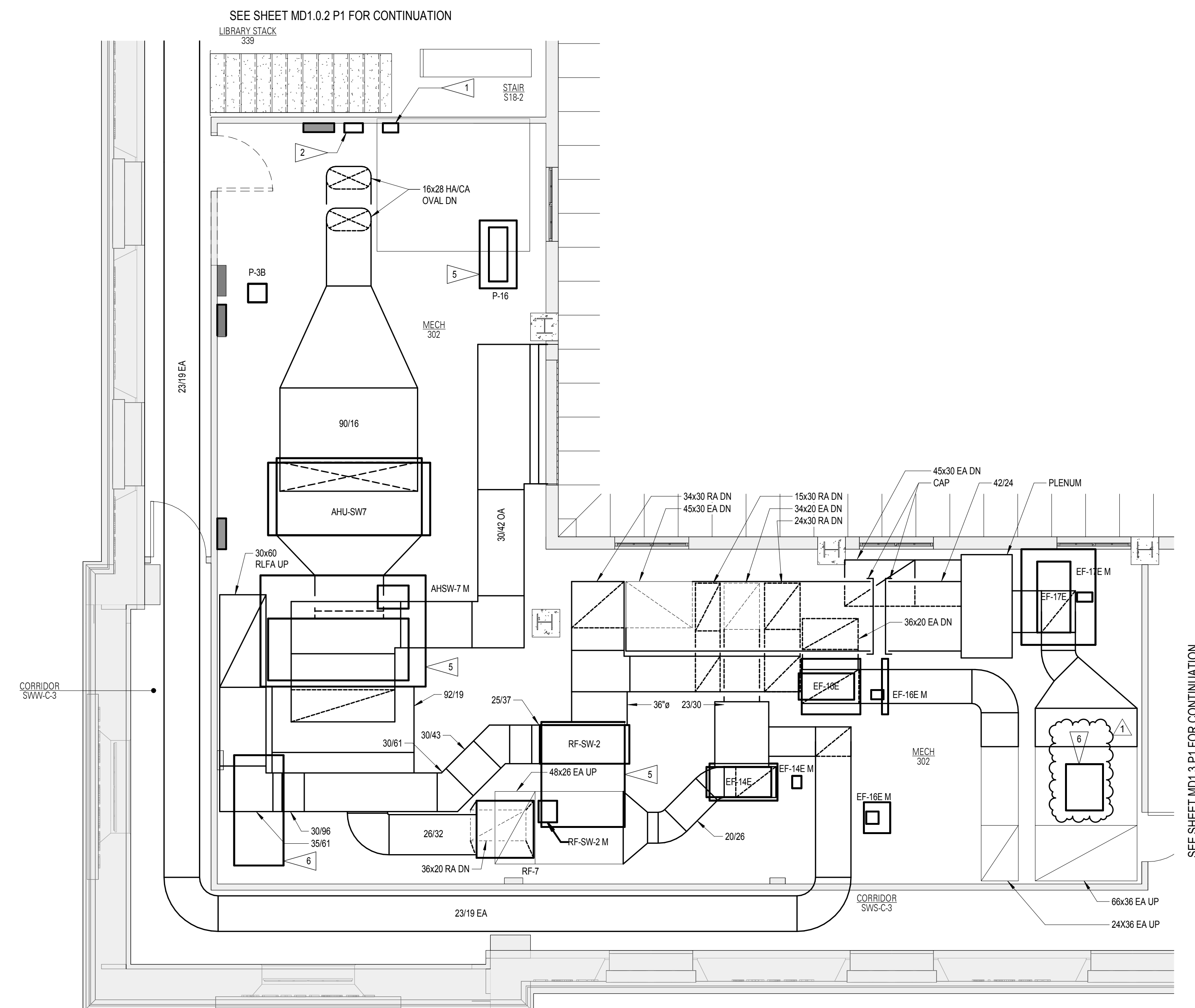
FLAG NOTES

- EXISTING BMCS PANEL. IT IS BELIEVED TO ONLY SERVE EQUIPMENT DEMO IN PHASE 1. CONTRACTOR SHALL VERIFY WHAT ALL PANEL SERVICES AND NOTIFY ENGINEER IN WRITING IF PANELS SERVES EQUIPMENT OR ITEMS OTHER THAN PHASE 1. CONTRACTOR SHALL CONVERT ALL POINTS THAT MUST BE KEPT ACTIVE TO NEW BMCS SYSTEM AND PANEL. DEMO PANEL AFTER CONFIRMED TO SERVE ONLY PHASE 1 OR AFTER OTHER POINTS CONVERTED TO NEW BMCS.
- DEMO EXISTING PNEUMATIC CONTROL PANEL.
- REMOVE EXISTING ACCU AND FURNACE SERVING ROOM 1104V AND ASSOCIATED DUCTWORK, PIPING, CONTROLS COMPLETE.
- RELOCATE VACUUM PUMP TO OWNER DESIGNATED ROOM ON BASEMENT LEVEL. VERIFY WITH OWNER.
- MECHANICAL CONTRACTOR TO REMOVE INERTIA BASE.
- REMOVE EXISTING ABANDONED CONCRETE PAD. SEE STRUCTURAL.
- RELOCATE EXISTING VP-1 WATER SOFTENER. SEE NEW WORK PLAN FOR NEW LOCATION.



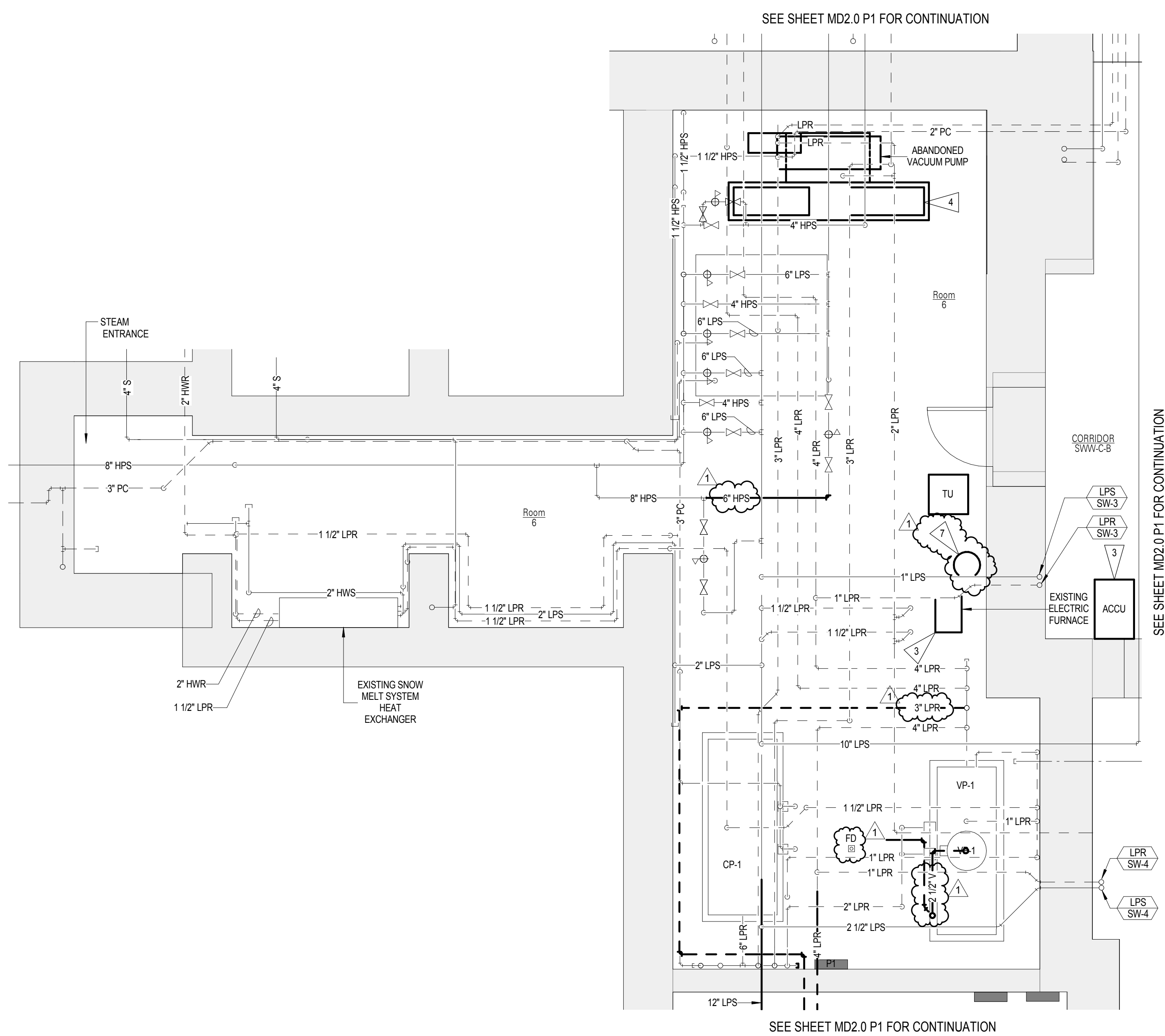
3 P1 PARTIAL ENLARGED MECHANICAL 302 FLOOR PLAN - DEMO - PIPING

1/4" = 1'-0" 2' 4' 8' 12' 16' 20'



1 P1 PARTIAL ENLARGED MECHANICAL 302 FLOOR PLAN - DEMO - HVAC

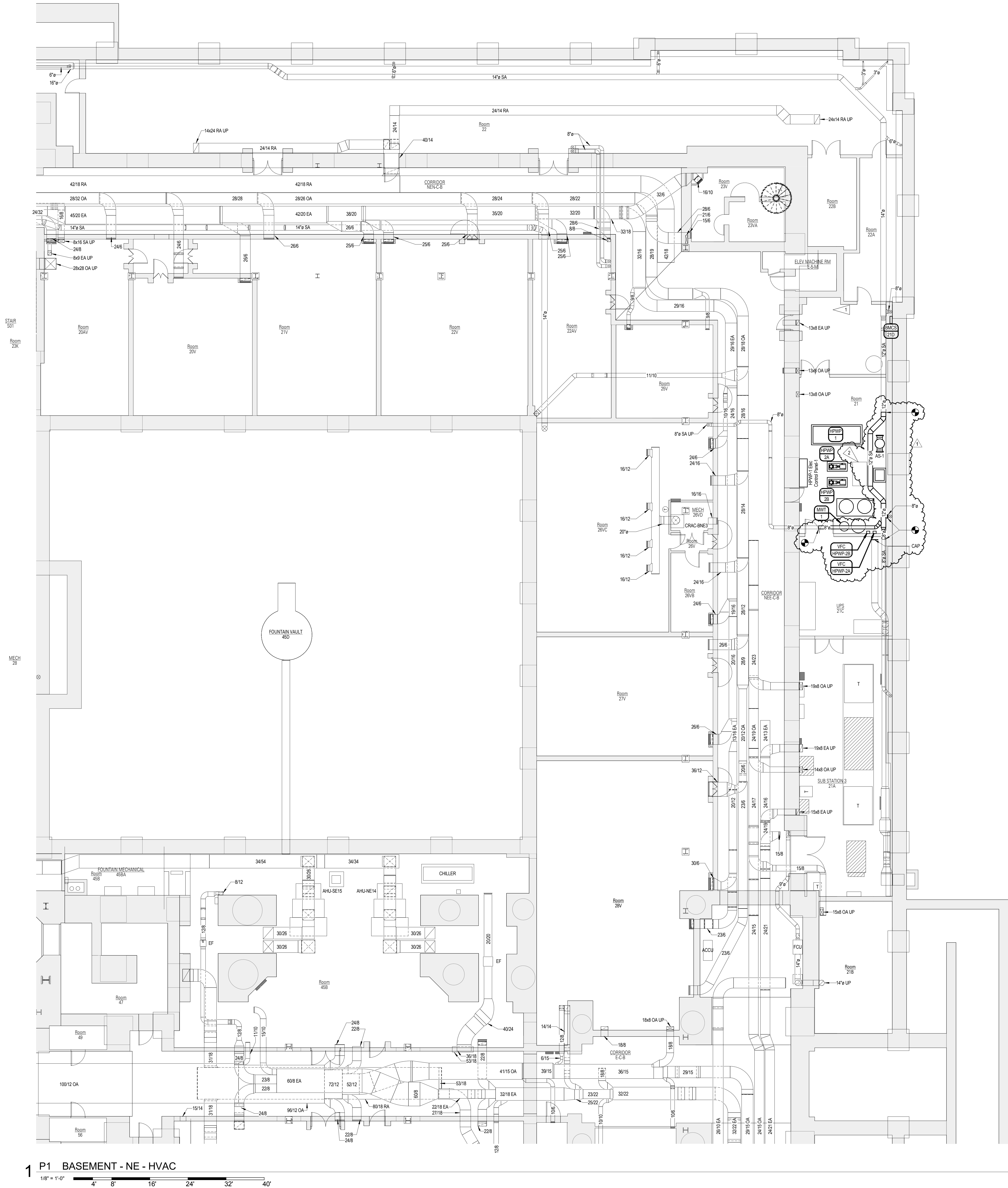
1/4" = 1'-0" 2' 4' 8' 12' 16' 20'



2 P1 PARTIAL ENLARGED MECHANICAL 6 FLOOR PLAN - DEMO - PIPING

1/4" = 1'-0" 2' 4' 8' 12' 16' 20'

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1 P1 BASEMENT - NE - HVAC
1/8" = 1'-0"
4' 8' 16' 24' 32' 40'

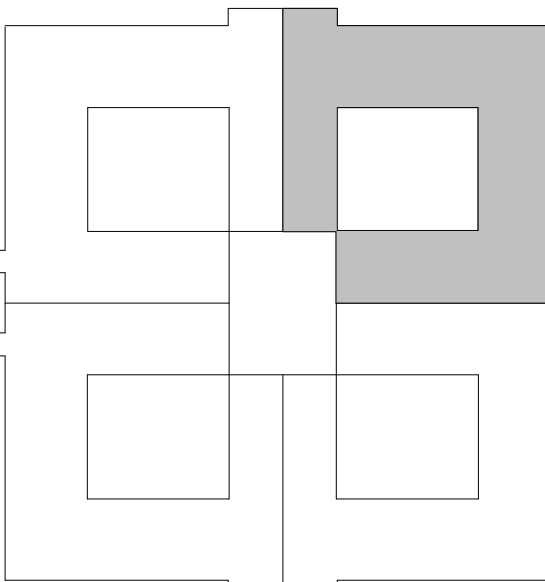
FLAG NOTES
POSSIBLE LOCATION FOR BMCS PANEL. COORDINATE WITH EQUIPMENT AND ELECTRICAL PANELS.
ELECTRICAL JUNCTION BOX AT CEILING. DO NOT INSTALL ANYTHING BELOW THIS JUNCTION BOX.
GENERAL NOTES
1. SEE SHEET M0.0 P1 FOR ALL GENERAL NOTES.



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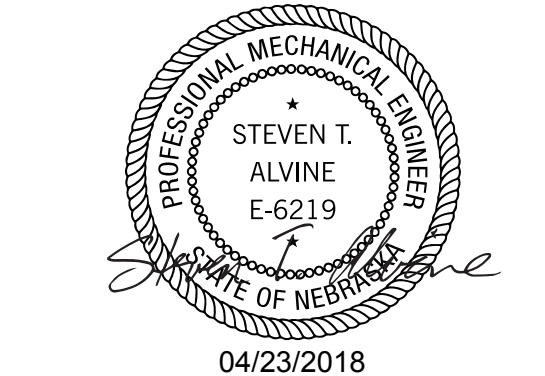


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PROJECT: OCC 2014485 DATE: APRIL 23 2018
BY: L14077

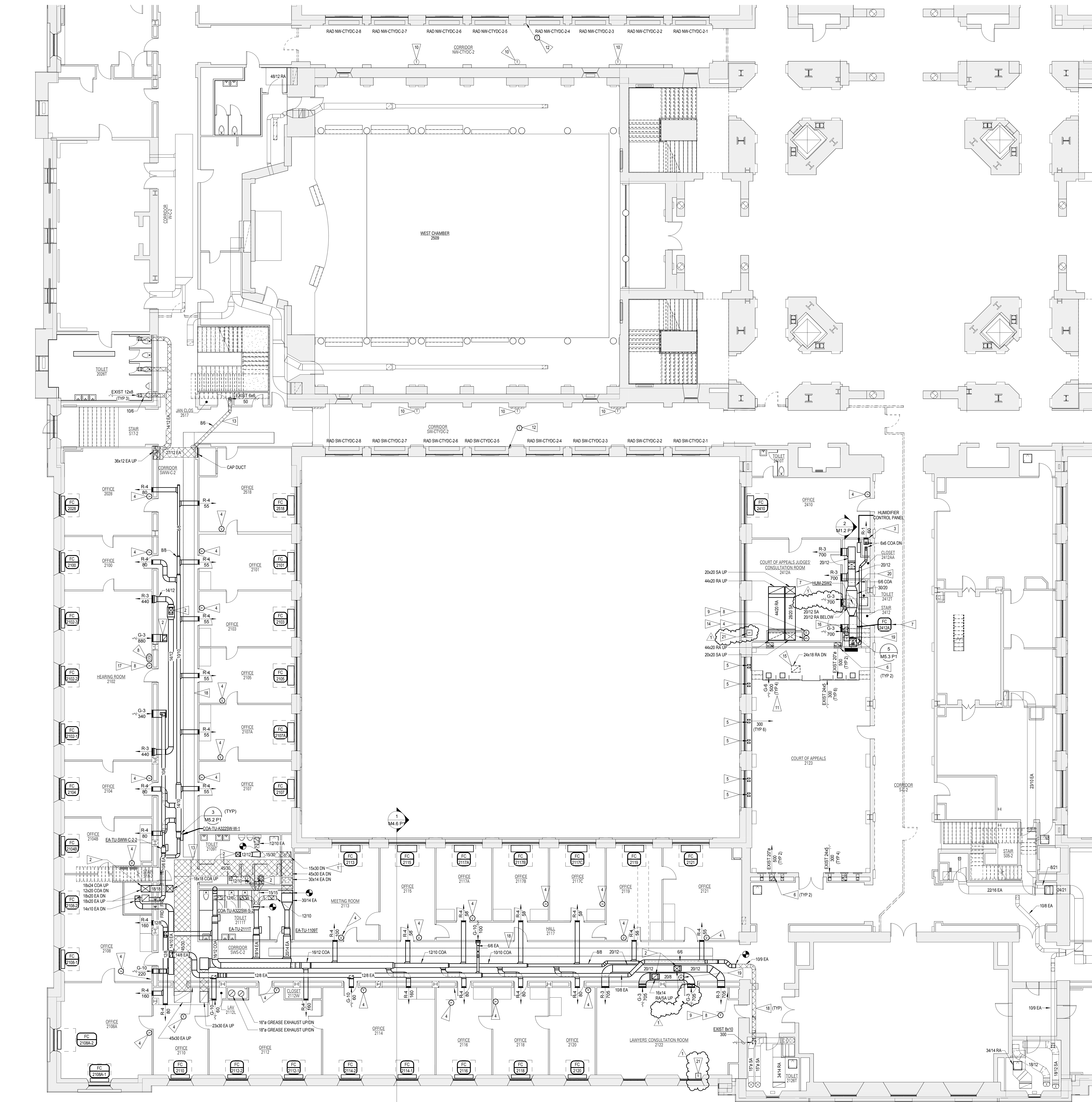


BASEMENT FLOOR PLAN - NE - HVAC

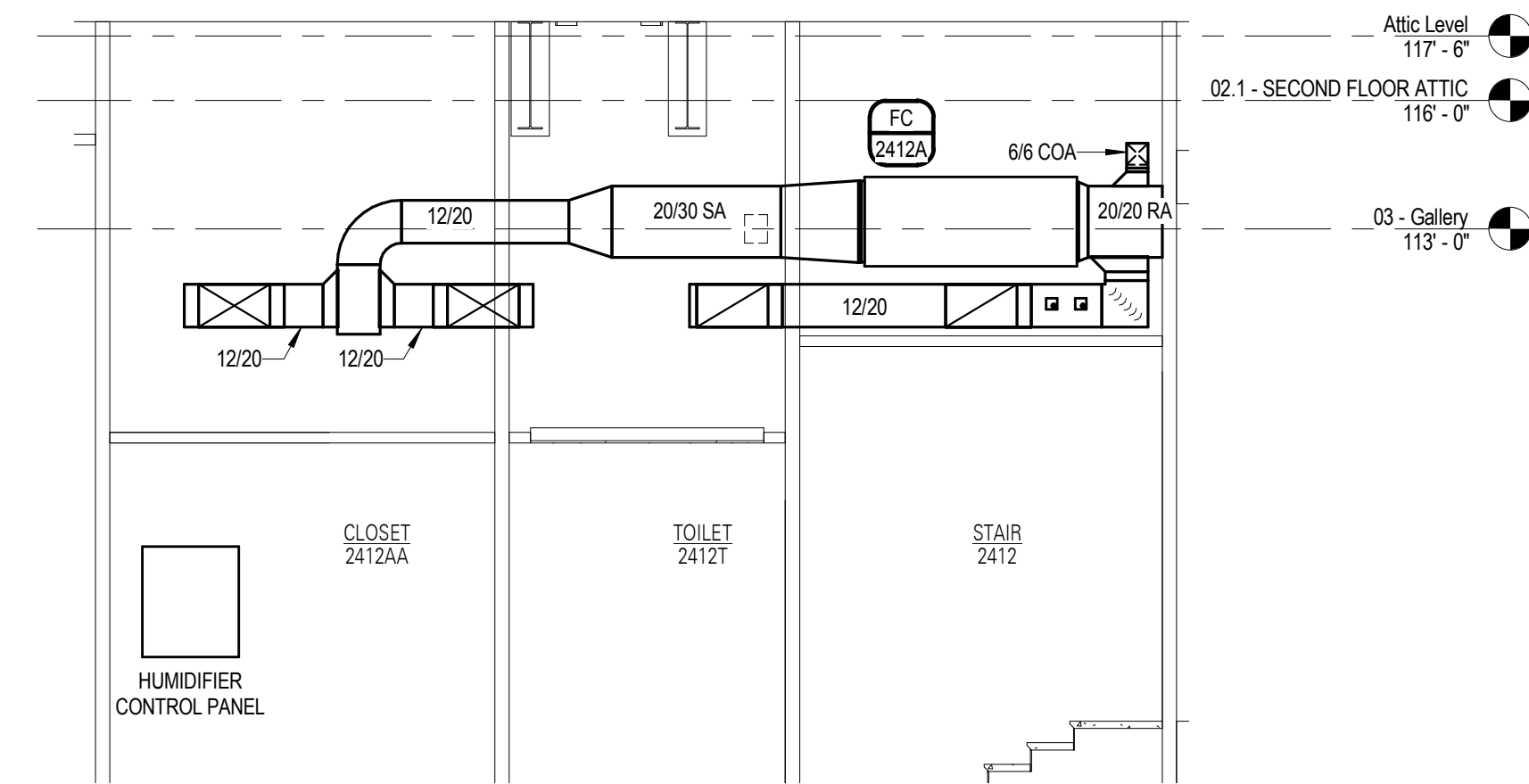
NORTH
1
M1.0.3
P1

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1 P1 SECOND FLOOR - SW - HVAC
1/8" = 1'-0"
4' 8' 16' 24' 32' 40'



2 SECTION LOOKING EAST AT ROOM 2412A
1/4" = 1'-0"
2' 4' 8' 12' 16' 20'

FLAG NOTES

- EXISTING RETURN AIR DUCT CONVERTED TO CONDITIONED OUTSIDE AIR.
- ROUTE DUCT UP TO SECOND FLOOR ATTIC. SEE SHEET M1.2.P1.
- BALANCE CONDITIONED OUTSIDE AIR TO 110 CFM.
- SHALLOW DEPTH MOUNTING BOX AND CONDUIT IN WALL BY ELECTRICAL CONTRACTOR. MECHANICAL CONTRACTOR TO MOUNT THERMOSTAT FOR ROOM AND CONTROL WIRING DOWN TO FIRST FLOOR. SEE ARCHITECTURAL FOR WALL CUTTING AND PATCHING.
- INSTALL OPEN 10"x4" UP THROUGH FLOOR WITHIN EXISTING WOOD RADIATOR ENCLOSURE. FLOOR OPENING SIZE SHALL BE LARGE ENOUGH TO ALSO ACCOUNT FOR THE DUCT INSULATION. PAINT THE INSIDE OF THE DUCTWORK TO BE FLAT BLACK DOWN THROUGH THE FLOOR.
- INSTALL OWNER PROVIDED CIRCULAR SUPPLY AIR GRILLES ON WALL. VERIFY THE EXACT LOCATION WITH THE OWNER.
- PROVIDE WATER TIGHT DRIP PAN WITH WATER DETECTION SENSOR BELOW THIS PAN CONSOLE FOOTPRINT AND BELOW DUCT MOUNTED HUMIDIFIER.
- ELECTRICAL CONTRACTOR TO INSTALL SHALLOW DEPTH MOUNTING BOX IN WALL FOR ROOM TEMPERATURE SENSOR. ELECTRICAL CONTRACTOR TO INSTALL CONTROLS CONDUIT UP TO SECOND FLOOR ATTIC. MECHANICAL CONTRACTOR TO MOUNT 1-STAT AND WIRE.
- CONTROL THE FINNED TUBE AND THE VRF FAN COIL FOR THIS ROOM WITH THIS VRF ROOM TEMPERATURE SENSOR. SEE THE FINNED TUBE LOCATIONS ON THE PIPING DRAWINGS.
- ABANDONED EXISTING PNEUMATIC THERMOSTAT.
- INSTALL GRILLE IN WOOD FLOOR OF JUDGE'S BENCH UNDER THE DESKTOP CONCEALED FROM VIEW AS MUCH AS POSSIBLE.
- MOUNT NEW THERMOSTAT ON INSULATED BASE ON VERTICAL FACE OF COLUMN REVEAL EDGE AT 48" AFF. ROUTE THERMOSTAT CABLE IN CORNER OF WALL DOWN TO RADIATOR CABINET AND INTO FIRST FLOOR CEILING CAVITY TO BMCS CONNECTION. SEE SPECIFICATIONS FOR THIS 'HALL OF FAME' HEATING SEQUENCE OF CONTROL. ROUTINGS OF CABLE AS APPROVED BY ENGINEER.
- CROSSHATCHED ORIGINAL DUCTWORK TO BE CLEANED. (TYP) SEE SPEC.
- INSTALL ROOM TEMPERATURE SENSOR THAT ALLOWS OCCUPANT TO ADJUST SETPOINT OF COURT OF APPEALS 2123 WHICH IS SERVED BY TEMPORARY AHU-2123 LOCATED IN BASEMENT. CONNECT THIS ROOM TEMPERATURE SENSOR TO THE REMOTE DUCT MOUNTED TEMPERATURE AND HUMIDITY SENSOR SHOWN ON FIRST FLOOR. ELECTRICAL CONTRACTOR TO PROVIDE RECESSED BOX AND CONCEALED 1/2" CONDUIT FOR THERMOSTAT WIRE.
- THE RETURN AIR DUCT SHALL EXTEND 1" ABOVE THE FLOOR AND OPEN TO THE RETURN AIR PLENUM UNDER THE JUDGE'S BENCH.
- PLACE DUCT MOUNTED CO2 SENSOR BEFORE COA CONNECTION. PROVIDE DUCT ACCESS DOOR.
- VRF ROOM TEMPERATURE SENSOR TO CONTROL EC2102.1 FC: 2102.2, EC2102.3, AND EC2102.4.
- NEW CATWALK LOCATED ABOVE THE CEILING. SEE ARCHITECTURAL AND STRUCTURAL.
- HUMIDITY SENSOR MOUNTED IN RETURN AIR DUCT BEFORE COA CONNECTION.
- PROVIDE STAINLESS STEEL SECTION OF DUCTWORK (APPROX 48" LONG) WITH WATER TIGHT BOTTOM WITH DRAIN CONNECTION. CONFIGURE STAINLESS STEEL DUCT SECTION TO HOLD ANY WATER AND PREVENT WATER TRAVEL DOWN OR UP STREAM OF 48" SECTION. PROVIDE 3/4" CONDENSATE PIPE AND TRAP FOR STAINLESS STEEL DUCT SECTION. CONFIGURE STAINLESS STEEL DUCT SECTION TO HAVE LOW POINT TROUGH FOR DRAIN CONNECTION.
- PROVIDE WINDOW TEMPERATURE SENSOR AND CONTROLLER (INSTEAD VAPOR LOGIC OR APPROVED EQUAL) FOR USE IN THE HUMIDIFIER SEQUENCE OF CONTROL. MOUNT THE CONTROLLER INSIDE THE WOODEN BENCH BELOW THE WINDOW. DRILL A SMALL HOLE AS INCONSPICUOUS AS POSSIBLE (WITH THE OCC'S APPROVAL) AND ROUTE WIRING TO THE WINDOW TEMPERATURE SENSOR MOUNT SENSOR TO WINDOW AS CORNER AS LOW AS POSSIBLE. CONNECT CONTROLLER OUTPUT TO THE BMCS.

GENERAL NOTES

- SEE SHEET M1.0.P1 FOR ALL GENERAL NOTES.

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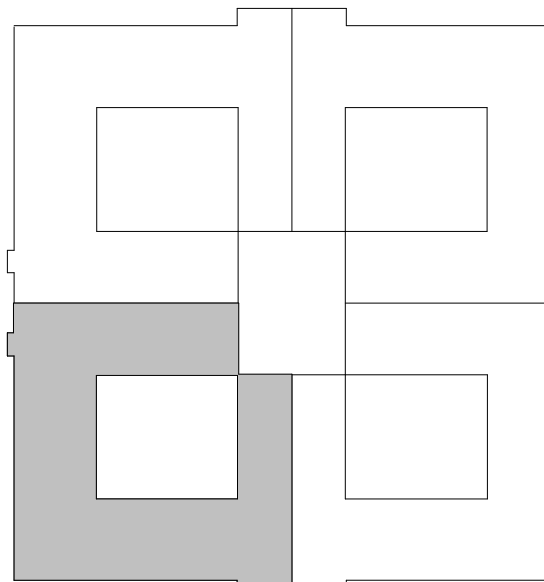
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KEYPLAN - SOUTHWEST

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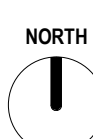
NEBRASKA STATE CAPITOL HVAC REPLACEMENT AND WINDOW RESTORATION

PROJECT: OCC 201405 BVH 114077 DATE: APRIL 23, 2018

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SECOND FLOOR PLAN - SW - HVAC



M1.2
P1

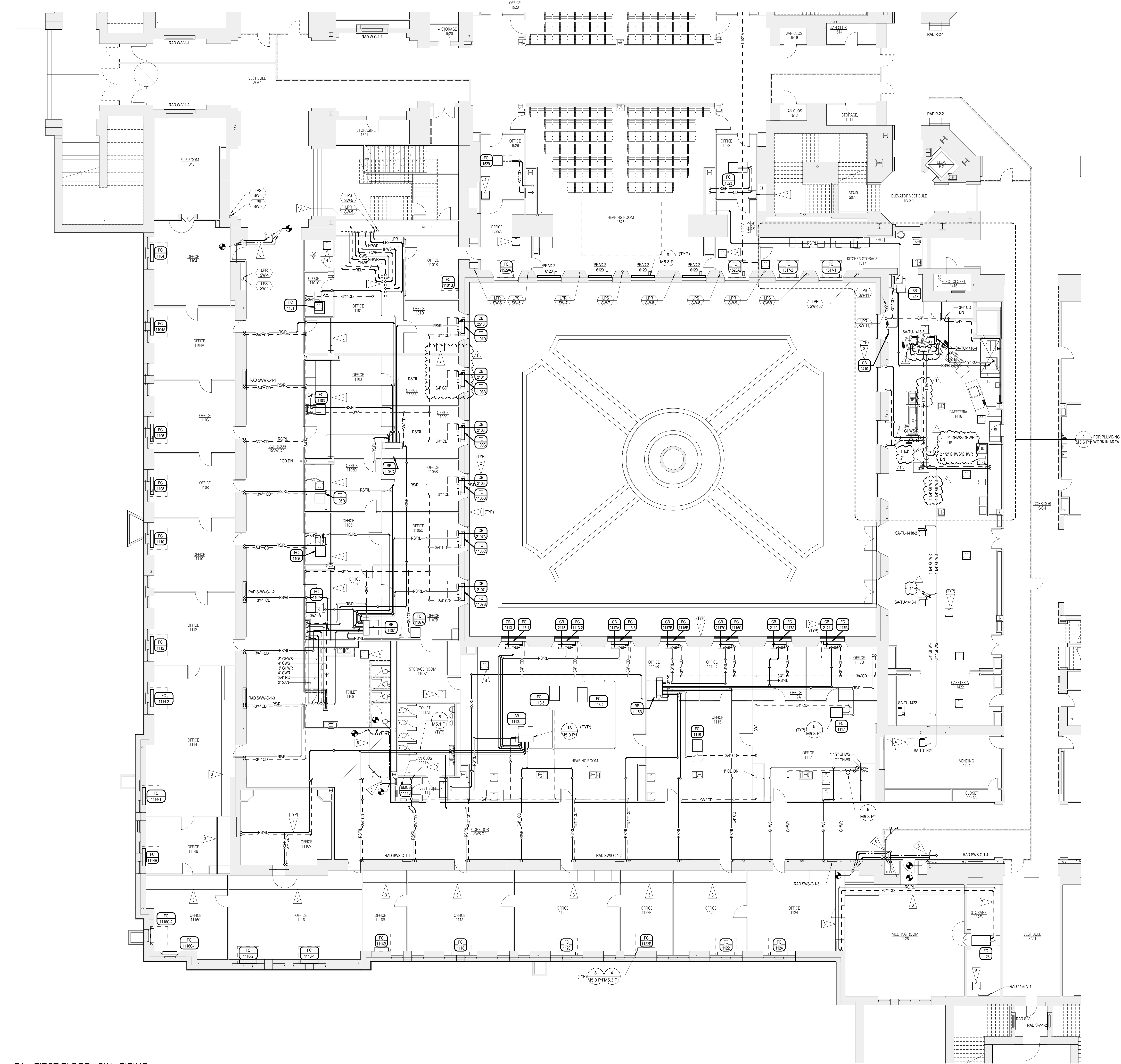
P1

FLAG NOTES

- ROUTE ALL PIPING AND CONTROLS CONDUITS AS HIGH AS POSSIBLE ABOVE THE EXISTING CATWALK AND CABLE TRAY SYSTEM WHICH RUNS PARALLEL WITH THE COURTYARD WALL ABOVE THE CEILING.
- INSTALL A VRF EVF BOX ON THE EXTERIOR WALL, NEXT TO THE VRF CONTROL BOX IN THE CEILING CAVITY. THE VRF EVF BOX AND CONTROL BOX SHALL SERVE THE LOW HEIGHT FAN COIL LOCATED DIRECTLY ABOVE ON SECOND FLOOR (TYPICAL ALL VRF CONTROL BOXES).
- NEW SOFFIT, SEE ARCHITECTURAL.
- CEILING ACCESS DOOR, SEE ARCHITECTURAL.
- FLOOR CAVITY ACCESS DOOR, SEE ARCHITECTURAL.
- INSTALL NEW CHW, HW, SAN AND VENT PLUMBING ABOVE THE PLASTER CEILING ELEVATION IN THIS AREA TO SERVE TOILET 2102T. MATCH EXISTING SIZES. FIELD VERIFY EXACT EXISTING LOCATIONS. EXISTING PIPING THAT IS ENCASED INTO THE WALLS SHALL REMAIN.
- PIPING IS EXPOSED IN THIS ROOM. INSTALL KSRL PIPING WITH RIGID COPPER. INSTALL FLAT WHITE PVC JACKET ON ALL EXPOSED PIPING.
- INSTALL NEW CHW, HW, SAN AND VENT PLUMBING ABOVE THE PLASTER CEILING ELEVATION IN THIS AREA TO SERVE TOILET 2020T. MATCH EXISTING SIZES. FIELD VERIFY EXACT EXISTING LOCATIONS. EXISTING PIPING THAT IS ENCASED INTO THE WALLS SHALL REMAIN.
- DRAIN 3/4" CONDENSATE PIPING DOWN TO EXISTING UTILITY SINK. INSTALL EXPOSED PIPING HEAT 1" WITH WALL MOUNTED SUPPORTS. PROVIDE AIR GAP ABOVE THE FLOOD RIM OF THE UTILITY SINK.
- 6" REL DN, 4" V DN, 3" GHW/SCHWR DN, 3" CWS/CWR DN, 6" HPW/SHPWR DN, 4" LPS DN, 2" LPS DN.
- 6" REL UP, 4" V UP, 3" GHW/SCHWR UP, 3" CWS/CWR UP, 6" HPW/SHPWR UP, 4" LPS UP, 2" LPS UP.

GENERAL NOTES

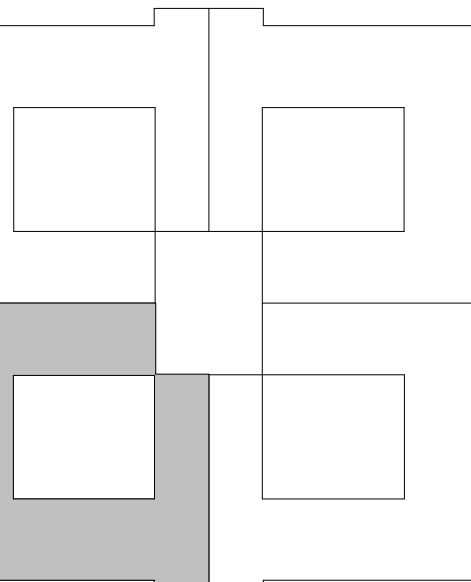
- SEE SHEET M0.0 P1 FOR ALL GENERAL NOTES.



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SPECIFICATIONS.



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CT: OCC 201405
BY: L14077
DATE: APRIL 23 2014



SECOND FLOOR ATTIC PLAN - PIPING

M2.2.1

P1

GENERAL NOTES

SEE SHEET M0.0 P1 FOR ALL GENERAL NOTES

FLAG NOTES

EXISTING CATWALK, SEE ARCHITECTURAL

2 NOT USED.

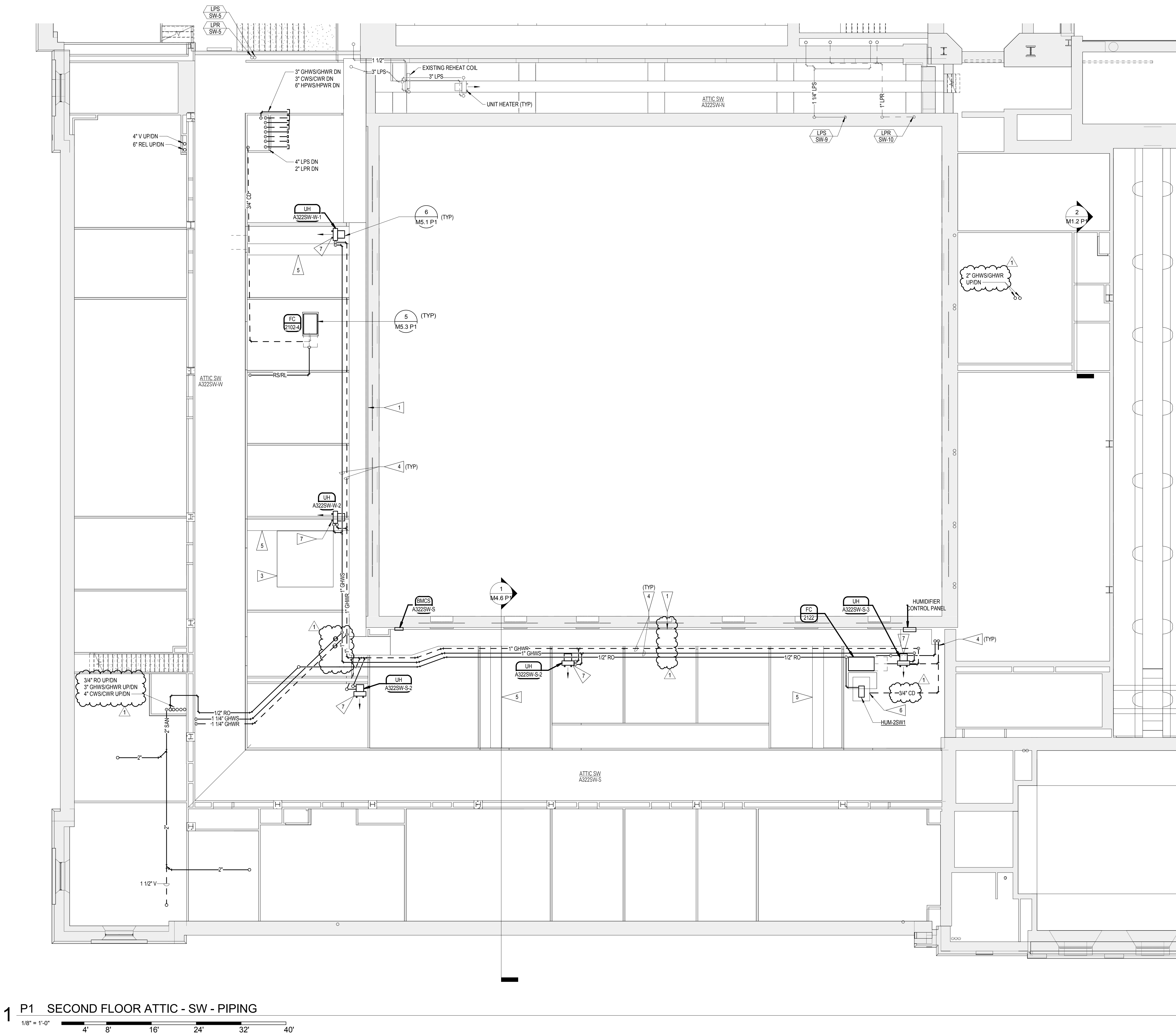
SECOND FLOOR CEILING TO BE REMOVED IN THIS AREA FOR CONSTRUCTION ACCESS TO SECOND FLOOR ATTIC, SEE

ARCHITECTURAL.

4. ROUTE PIPING AS HIGH AS POSSIBLE.

NEW CATWALK, SEE ARCHITECTURAL AND STRUCTURAL.

7 HANG UNIT HEATER FROM EXISTING UNIT HEATER SUPPORT AT THE ROOF STRUCTURE.

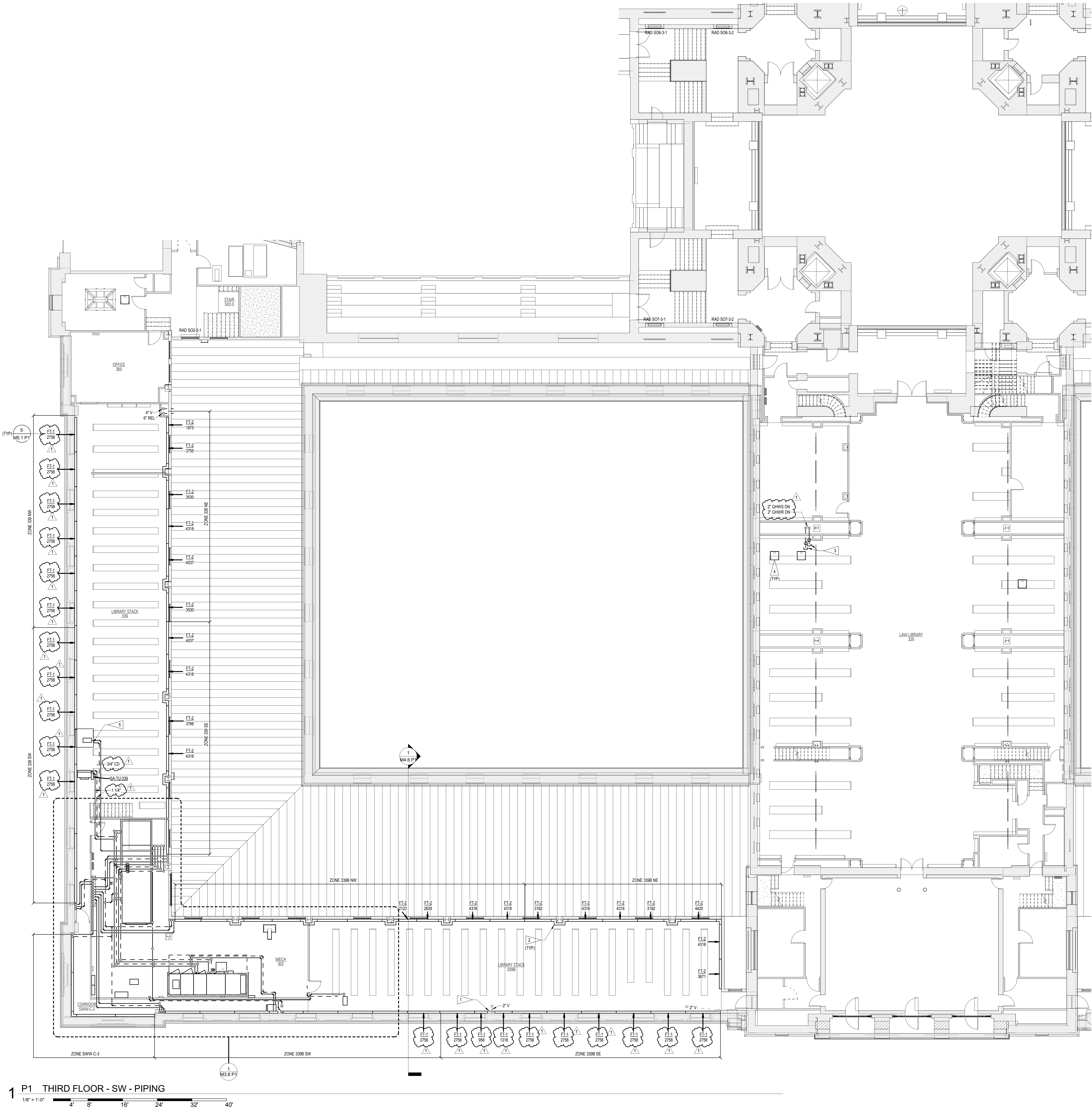


1 P1 SECOND FLOOR ATTIC - SW - PIPING

1/8" = 1'-0"

A horizontal graphic scale bar with alternating black and white segments. The segments are labeled with their lengths in feet: 4', 8', 16', 24', 32', and 40'.

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GENERAL NOTES

1. SEE SHEET M0.0 P1 FOR ALL GENERAL NOTES.

FLAG NOTES

1. PROVIDE FINISH COVER BETWEEN SECTIONS OF ACTIVE FINISH SECTIONS TO ENCAPSULATE EXISTING 2" VENT PIPING.
2. WRAP FINISH TUBE PIPING AND COVER TIGHT AROUND COLUMN / CORNER.
3. EXTEND GHWS / GHWs TO ABOVE THE PLASTER CEILING AND CAP NEAR CHASE FOR CONTINUATION IN PHASE 2.
4. EXISTING CEILING ACCESS DOOR. SEE ARCHITECTURAL.
5. PROVIDE 3/4" CONDENSATE DRAIN TO STAINLESS STEEL DUCT SECTION.

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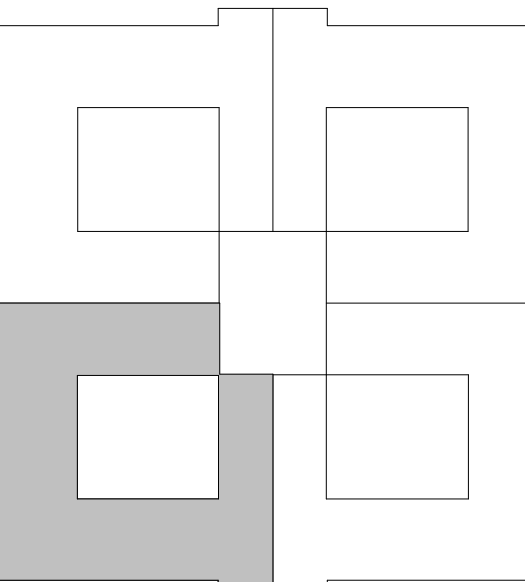
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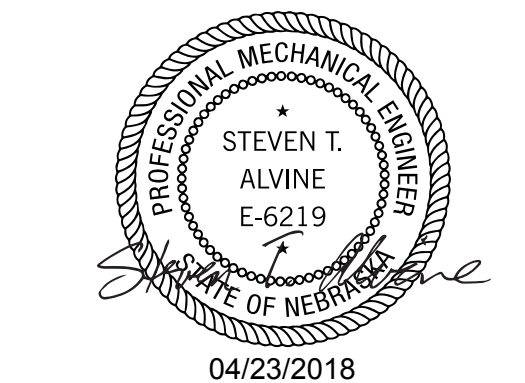
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PROJECT: OCC 2014405 BVH 1.14077 DATE: APRIL 23, 2018
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04/23/2018

THIRD FLOOR PLAN - SW - PIPING



M2.3
P1

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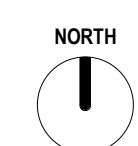
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NEBRASKA STATE CAPITOL HVAC REPLACEMENT AND WINDOW RESTORATION

PROJECT: OCC 2014485 BVH 1.14077 DATE: APRIL 23 2018



04/23/2018
ENLARGED MECHANICAL PLANS



M3.1
P1

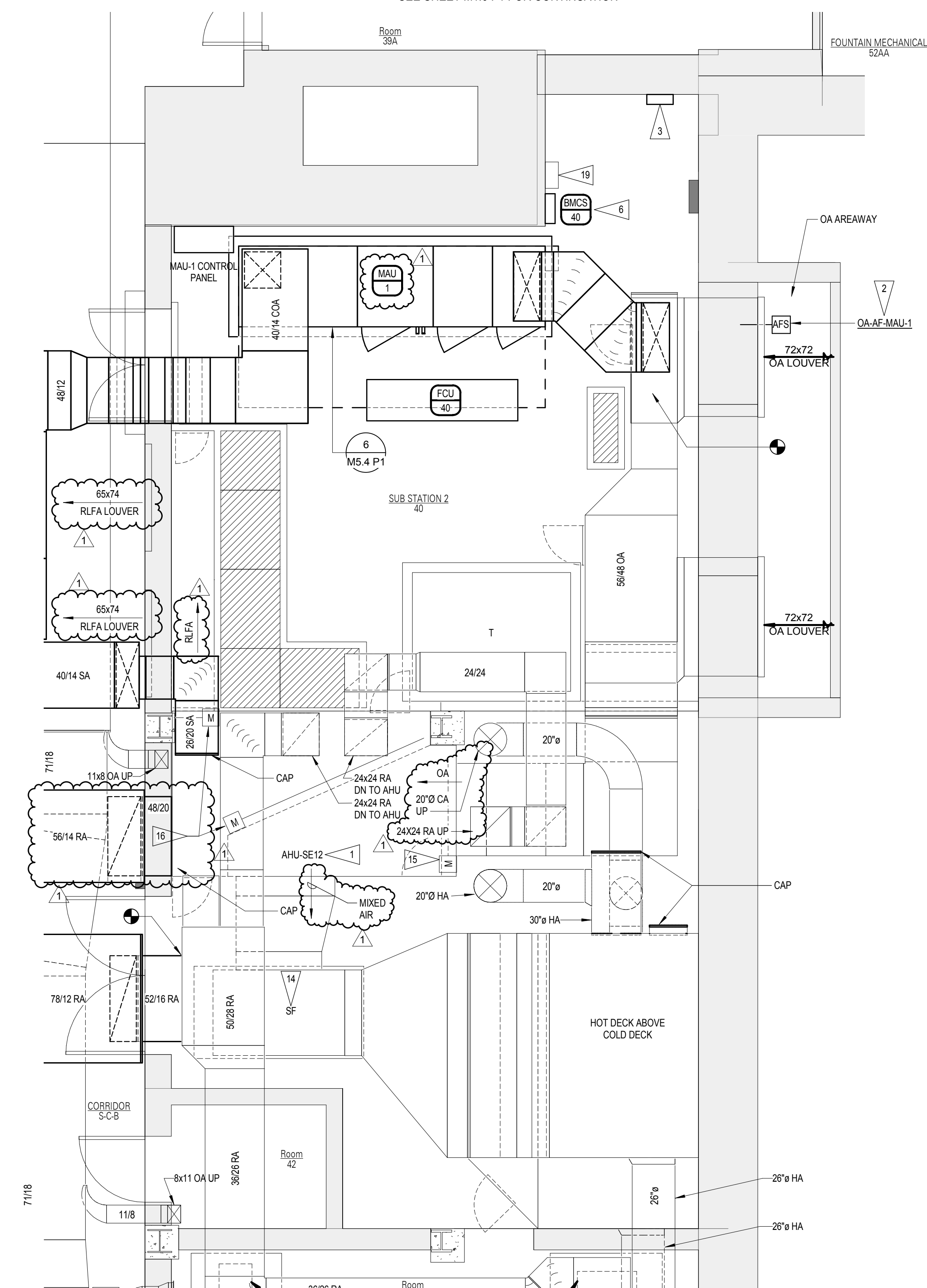
GENERAL NOTES

- SEE SHEET M3.0 P1 FOR ALL GENERAL NOTES.

FLAG NOTES

- AHU-SE12 SERVES THE COURT OF APPEALS WHICH IS IN PHASE 1 AND THE SUPREME COURT AND LAW LIBRARY WHICH ARE IN PHASE 2. ALL WORK OCCURRING TO THE AHU-SE12 SYSTEM SHALL BE PERMITTED TO MINIMIZE DOWN TIME AS MUCH AS POSSIBLE. COORDINATE THE SCHEDULE OF SHUT DOWN WITH THE OWNER AT LEAST TWO WEEKS IN ADVANCE.
- PROVIDE (1) OUTDOOR AIR FLOW MEASUREMENT SENSOR FOR MAU-1.
- TRANSMITTER PANEL FOR OA-AF-MAU-1.
- PROVIDE EXHAUST AIRFLOW MEASUREMENT SENSOR EA-AF-AHU-NE1-1 FOR CAVE MAU.
- TRANSMITTER PANEL FOR EA-AF-AHU-NE1-1.
- POSSIBLE BMCS PANEL LOCATION. COORDINATE WITH EQUIPMENT AND ELECTRICAL PANELS.
- PROVIDE OUTDOOR AIRFLOW MEASUREMENT SENSOR OA-AF-AHU-NE1-1.
- TRANSMITTER PANEL FOR OA-AF-AHU-NE1-1.
- DUCT MOUNTED CO2 SENSOR WITH DUCT ACCESS DOOR. LABEL INSULATED ACCESS DOOR TO READ "CO2 SENSOR INSIDE".
- INFILL EXISTING 45 1/4" x 51 1/2" WALL OPENING IN AIR TUNNEL WALL WITH 4" THICK INSULATED SANDWICH PANEL CONSISTING OF 2 LAYERS OF SHEET METAL ON EXTERIOR SIDE OF PANEL WITH 4" THICK LAYER OF POLYSTYRENE INSULATION IN BETWEEN. SEAL PERIMETER OF WALL INFILL WITH 4" WIDE SHEET METAL STRIPS AND CLEAR SILICON SEALANT. FIELD VERIFY EXISTING DIMENSIONS.
- INFILL EXISTING 61 3/8" x 57 3/8" WALL OPENING IN AIR TUNNEL WALL WITH 4" THICK INSULATED SANDWICH PANEL CONSISTING OF 2 LAYERS OF SHEET METAL ON EXTERIOR SIDE OF PANEL WITH 4" THICK LAYER OF POLYSTYRENE INSULATION IN BETWEEN. SEAL PERIMETER OF WALL INFILL WITH 4" WIDE SHEET METAL STRIPS AND CLEAR SILICON SEALANT. FIELD VERIFY EXISTING DIMENSIONS.
- CONTRACTOR SHALL SURVEY EF-25E CURRENT OPERATION AND SUBMIT WRITTEN CURRENT PERFORMANCE DATA FOR: AIRFLOW, STATIC PRESSURES, MOTOR NAMEPLATE DATA AND CURRENT RUNNING AMPERAGE TO ENGINEER TO EVALUATE. CONTRACTOR SHALL REBALANCE EF-25E AIRFLOW TO NEW AIRFLOW NOTE PROVIDED BY ENGINEER AFTER FAN EVALUATION.
- PROVIDE NEW MANUAL VOLUME DAMPER ON EXISTING EXHAUST AIR DUCT OPENING TO EF-25E. FIELD VERIFY OPENING DAMPER SIZE. USE THIS NEW DAMPER TO FINAL BALANCE EF-25E AND TO PROVIDE 500 CFM AT SEWAGE PUMP.
- BALANCE THE AHU-SE12 SUPPLY FAN TO 20,600 CFM OR AS CLOSE AS POSSIBLE WITHOUT CAUSING THE FAN TO SURGE. REPLACE THE FAN SHEAVE AND FAN BELT AS NEEDED FOR BALANCING.
- BALANCE THE EXISTING OA CONTROL DAMPER SETTINGS TO ALLOW FOR 20,600 CFM DURING ECONOMIZER OPERATION AND 3,000 CFM DURING NON-ECONOMIZER OPERATION.
- BALANCE THE RFA AND RA CONTROL DAMPER SETTINGS TO ALLOW FOR 18,800 CFM DURING ECONOMIZER OPERATION AND 2,500 CFM DURING NON-ECONOMIZER OPERATION.
- STACK THESE TRANSMITTER PANELS ON THE WALL WITH ONE ABOVE THE OTHER.
- UNDUCTED OA DAMPER ON TOP OF AHU-NE1.
- EXISTING AHU-SE12 PNEUMATIC / BMCS CONTROL PANEL.

SEE SHEET M1.0 P1 FOR CONTINUATION

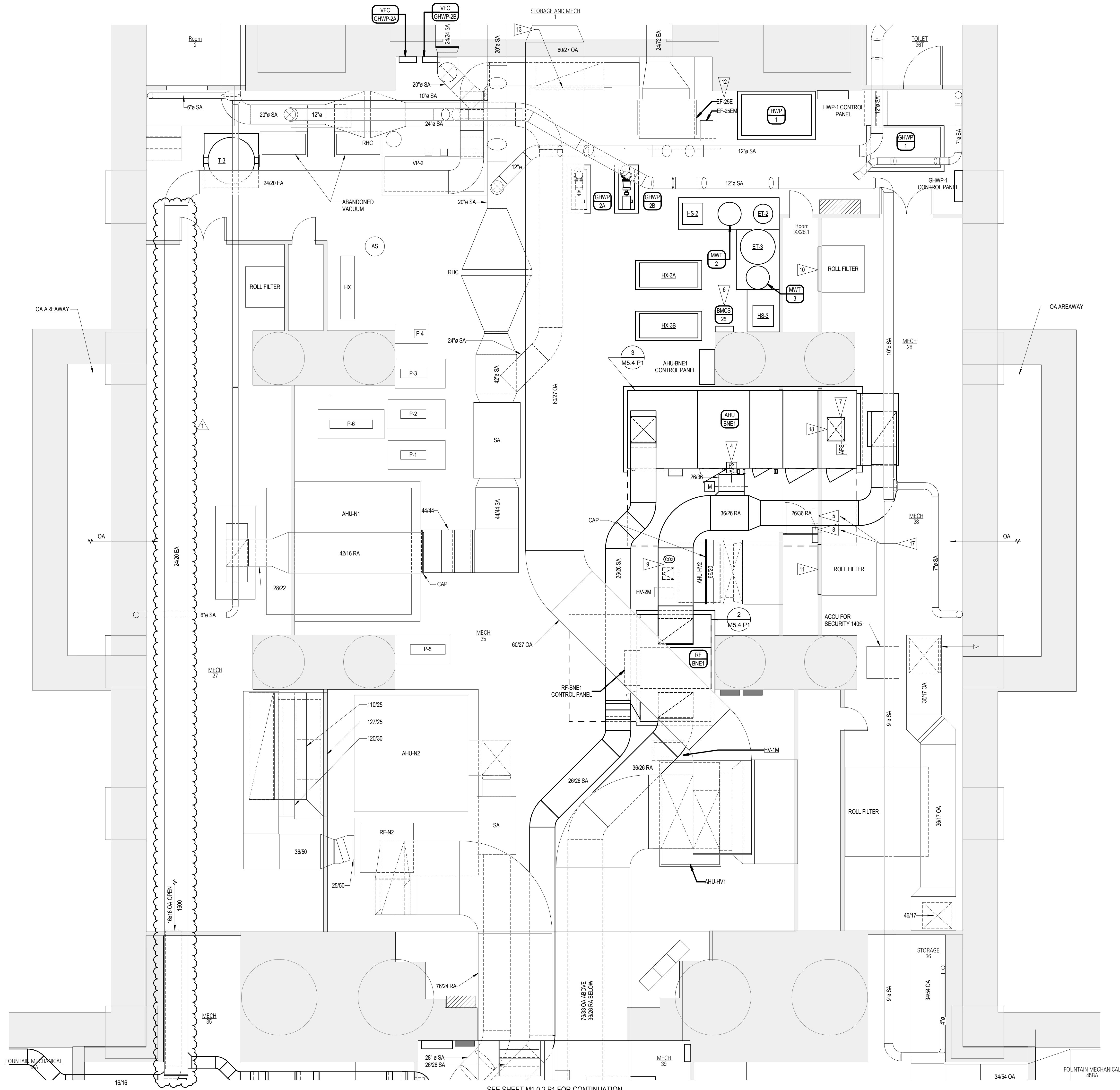


SEE SHEET M1.0 P1 FOR CONTINUATION

2 P1 PARTIAL ENLARGED MECH/ELEC 40 FLOOR PLAN - HVAC

1/4" = 1'-0" 2' 4' 8' 12' 16' 20'

SEE SHEET M1.0 P1 FOR CONTINUATION



SEE SHEET M1.0 P1 FOR CONTINUATION

1 P1 PARTIAL ENLARGED MECHANICAL 39 FLOOR PLAN NORTH - HVAC

1/4" = 1'-0" 2' 4' 8' 12' 16' 20'

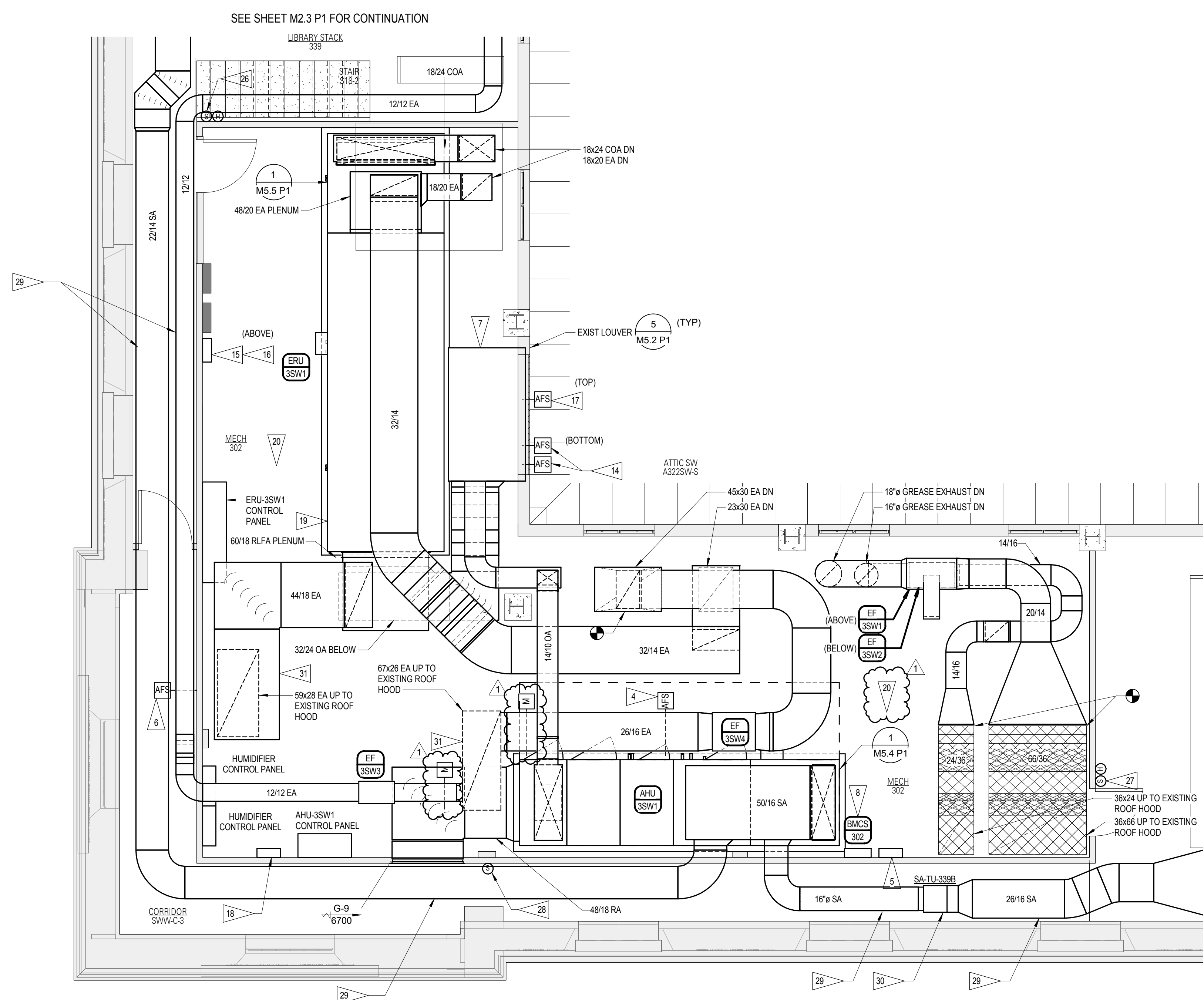
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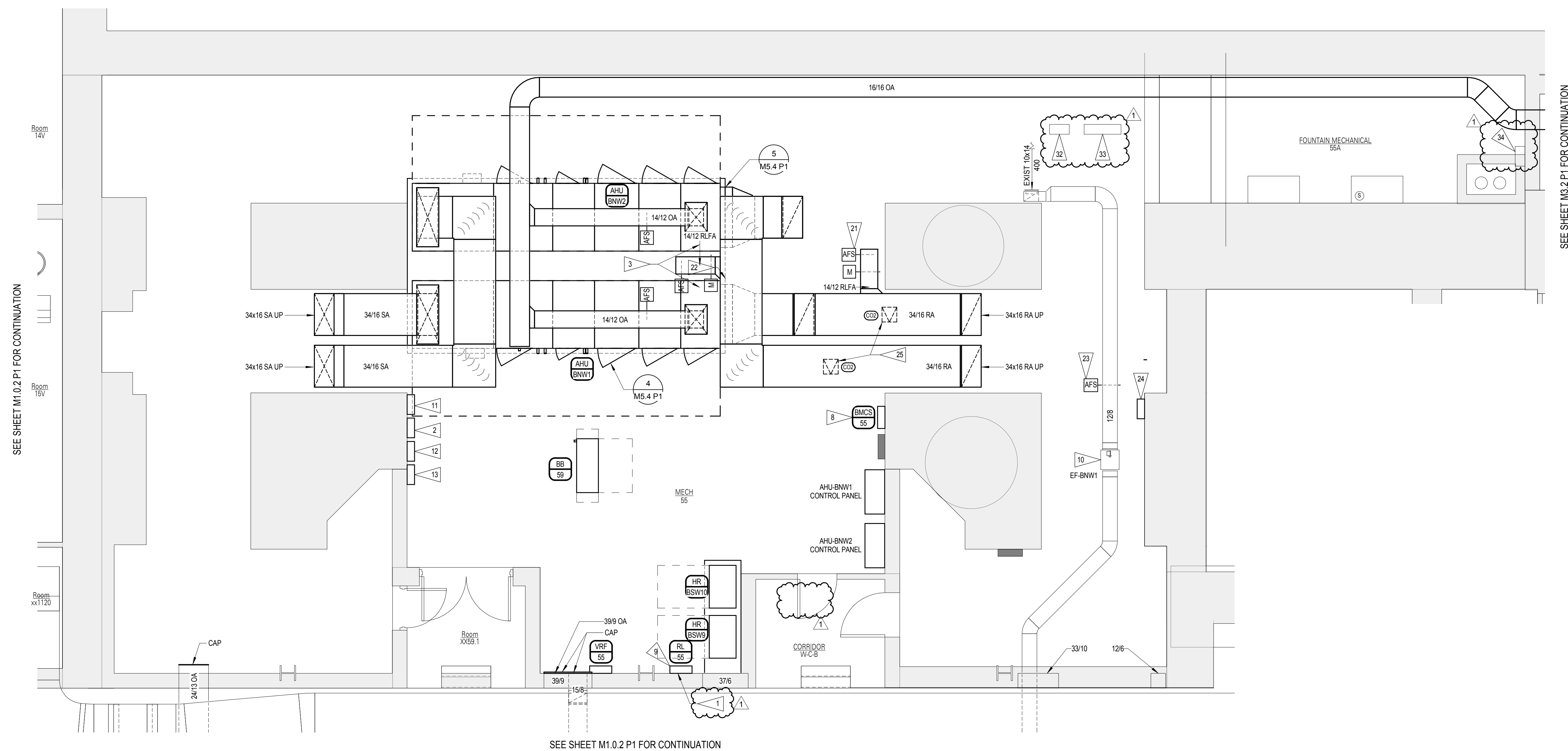
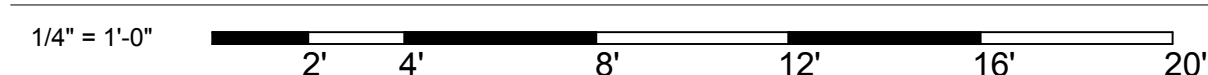
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- 1 VRF MAINCONTROLLER TO PROVIDE AND CONTROL TO INSTALL VRF SYSTEM CONTROL PANEL(S) ON WALL
- 2 TRANSMITTER PANEL FOR 0A-0AF-AHW1-1
- 3 PROVIDE OUTDOOR AIRFLOW MEASUREMENT SENSOR 0A-0AF-ERUSW1-1 AND 0A-0AF-BW1-2 FOR HEATING ROOMS 1025 AND 1024 AHUS
- 4 PROVIDE EXHAUST AIR FLOW MEASUREMENT SENSOR EAA-FF35W1-1 FOR SOUTHWEST QUADRANT VAULTS
- 5 TRANSMITTER PANEL FOR 0A-0AF-F35W1-1 AND 0A-0AF-F35W1-2
- 6 PROVIDE EXHAUST AIR FLOW MEASUREMENT SENSOR EAA-FF35W1-1 FOR WEST CHAMBER RESTROOMS
- 7 SPLIT EXISTING 200" LOUVER INTO TWO SECTIONS WITH TWO SEPARATE PLenums. THE TOP PLenums 160" AND THE BOTTOM 160" x 124" EXISTING LOUVER SHALL BE A OF BLANKED OFF EACH END OF EACH PLenum. INSTALL AN INLET STATIC DUCT TO EACH DOOR AS LARGE AS POSSIBLE ON EACH END OF EACH PLenum.
- 8 PROPOSED BMS ROOM LOCATION. COORDINATE SENSORS EQUIPMENT AND ELECTRICAL
- 9 REFRIGERANT LEAK DETECTION PANEL, SEE SPECIFICATIONS.
- 10 ADJUST EAM FAN MOTOR SPEED FOR BALANCING AS NEEDED.
- 11 TRANSMITTER PANEL FOR 0A-0AF-AHW1-2
- 12 TRANSMITTER PANEL FOR 0A-0AF-BW1-1
- 13 TRANSMITTER PANEL FOR 0A-0AF-ERUSW1-2
- 14 PROVIDE OUTDOOR AIRFLOW MEASUREMENT SENSOR 0A-0AF-ERUSW1-1 AND 0A-0AF-ERUSW1-2
- 15 TRANSMITTER PANEL FOR 0A-0AF-ERUSW1-1 AND 0A-0AF-ERUSW1-2
- 16 TRANSMITTER PANEL FOR 0A-0AF-AHW1-1 RACKED ON WALL ABOVE OTHER TRANSMITTER PANEL
- 17 PROVIDE (1) OUTDOOR AIRFLOW MEASUREMENT SENSOR 0A-0AF-AHW1-1
- 18 TRANSMITTER PANEL FOR 0A-0AF-F35W1-1
- 19 TWO AIR FLOWS 0A-0AF-ERUSW1-1 AND 0A-0AF-ERUSW1-2 SHALL BE USED TO DETERMINE THE FLOW RATE OF THE INLET OF THE (2) PLenums FANS COMPRISING EAM.
- 20 PROVIDE TWO (2) WATER DETECTION SENSOR TO SEN WATER LEAK ON FLOOR. DETECTION SHALL ALARM BMS AND ALERT EAM. DETECT ROOM LEAK. LOCATION SHOWN ON FLOOR BE DETECTED. VERY LOCATION ON W/ENGINEER. TOTAL OF 2 SENSORS IN ROOM 302.
- 21 RFA-AF-BW1-1
- 22 RFA-AF-BW1-2
- 23 PROVIDE EXHAUST AIR FLOW MEASUREMENT SENSOR EAA-FF35W1-1 FOR FOUNTAINS MECHANICAL ROOM 50A
- 24 TRANSMITTER PANEL FOR 0A-0AF-FB1W1
- 25 UNDER BASE BID ONLY, PROVIDE DETECT MOUNTED C2 SENSOR WITH DETECT ACCESS DOOR LABEL INSULATED ACCESS DOOR TO RE-AD
- 26 BMS ROOM TEMPERATURE SENSOR SHALL CONTROL THE REHEAT COIL ON SALTS308 AND ALL THE FINED TUBE ZONES SERVING REHEAT CORRIDOR SWB. SEE FINED TUBE ZONES AND CONTROL VALVE ON THE PPING DRAWINGS.
- 27 BMS ROOM TEMPERATURE SENSOR SHALL CONTROL THE REHEAT COIL ON SALTS308 AND ALL THE FINED TUBE ZONES SERVING REHEAT CORRIDOR SWB. SEE FINED TUBE ZONES AND CONTROL VALVE ON THE PPING DRAWINGS.
- 28 BMS ROOM TEMPERATURE SENSOR SHALL CONTROL THE REHEAT COIL ON SALTS308 AND ALL THE FINED TUBE ZONES SERVING REHEAT CORRIDOR SWB. SEE FINED TUBE ZONES AND CONTROL VALVE ON THE PPING DRAWINGS.
- 29 PROVIDE DETECT WITH PAINT GRP FINISH. SEE ARCHITECTURAL FOR DUCTWORK
- 30 INSTALL TERMINAL UNIT WITH CONTROL ACCESS ON SOUTH SIDE OF EAD LOUVER BELOW ROOF HOOD WITH ACCESS WITH A REMAIN BALL VALVE AND HOSE END. PROVIDE AN INSULATED DETECT ACCESS DOOR AS LARGE AS POSSIBLE ON THE SIDE OF TEH EAD AND MOUNTED ABOVE THE BOTTOM OF DETECT ACCESS DOOR. PROVIDE TWO SETS OF DUCTWORK BELOW ROOF HOOD WITH TWO DETECT VZC EAD.
- 31 EXISTING BMS CONTROL PANEL FOR THE FOUNTAIN 50A TO REMAIN
- 32 EXISTING FOUNTAIN EQUIPMENT CONTROL PANEL TO REMAIN
- 33 EXISTING SLUMP PUMP CONTROL PANEL TO REMAIN

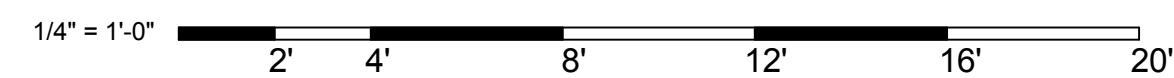
1. SEE SHEET M0.0 P1 FOR ALL GENERAL NOTES



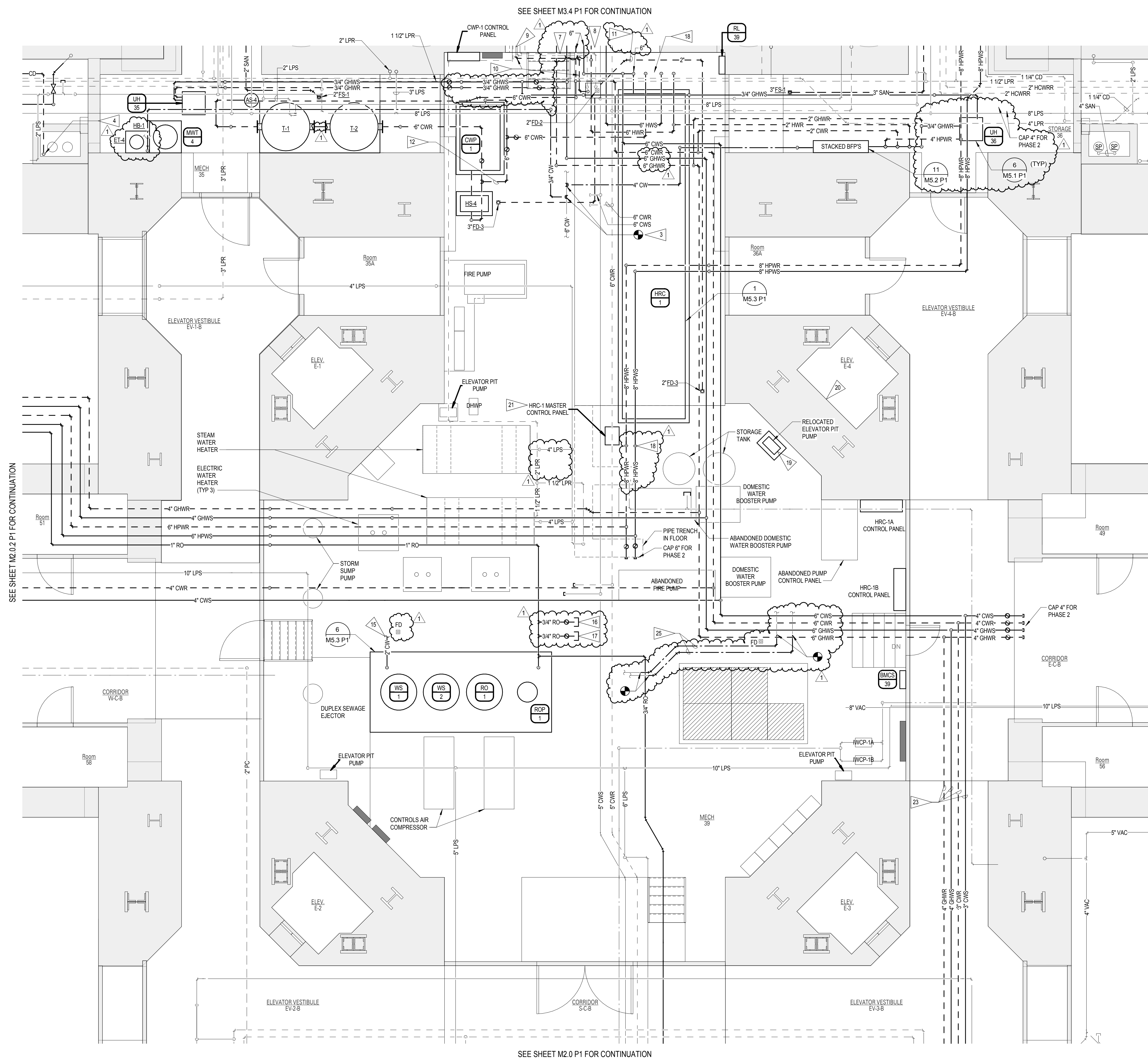
2 P1 PARTIAL ENLARGED MECHANICAL 302 FLOOR PLAN - HVAC



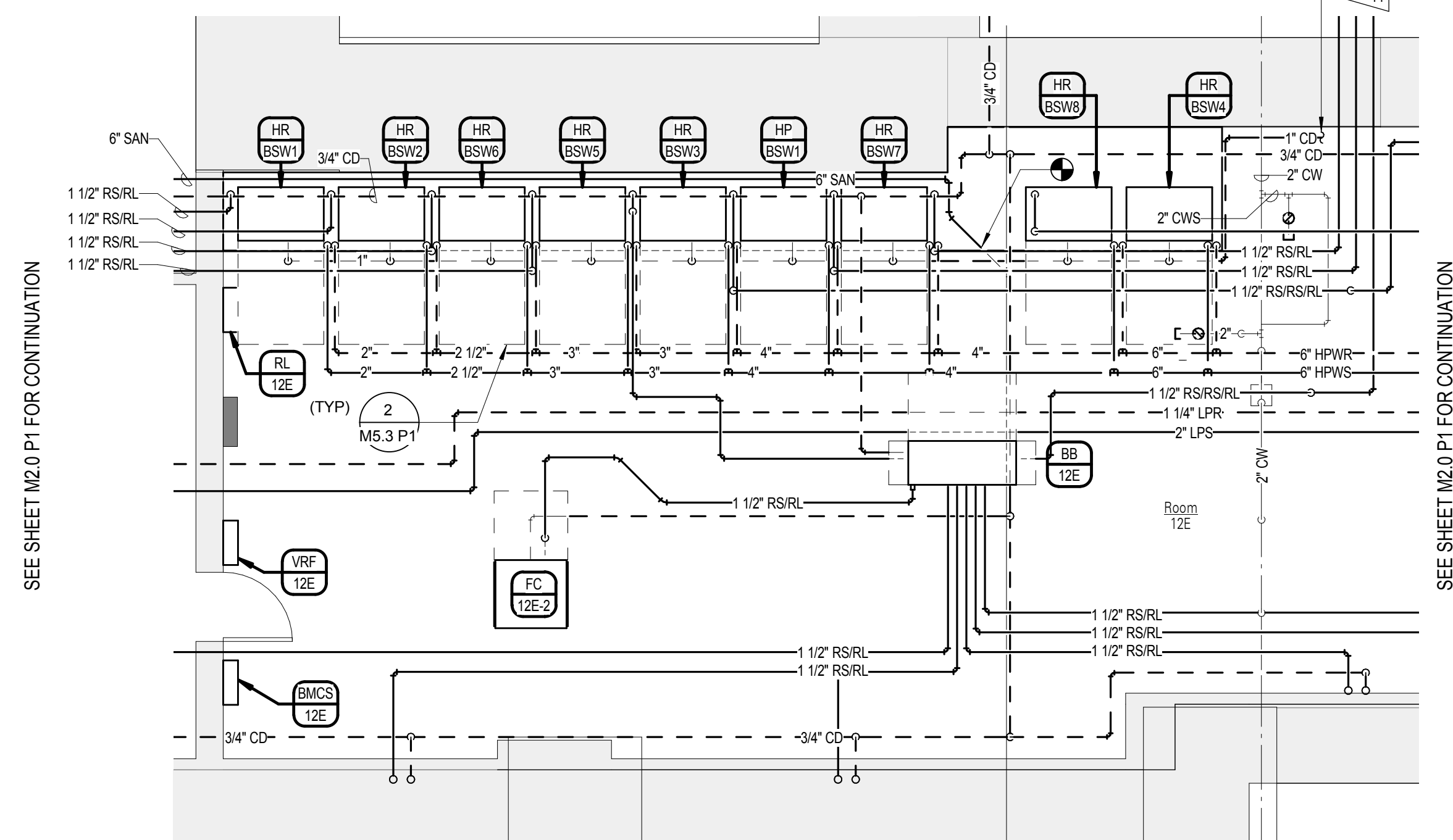
1 P1 PARTIAL ENLARGED MECHANICAL 55 FLOOR PLAN - HVAC



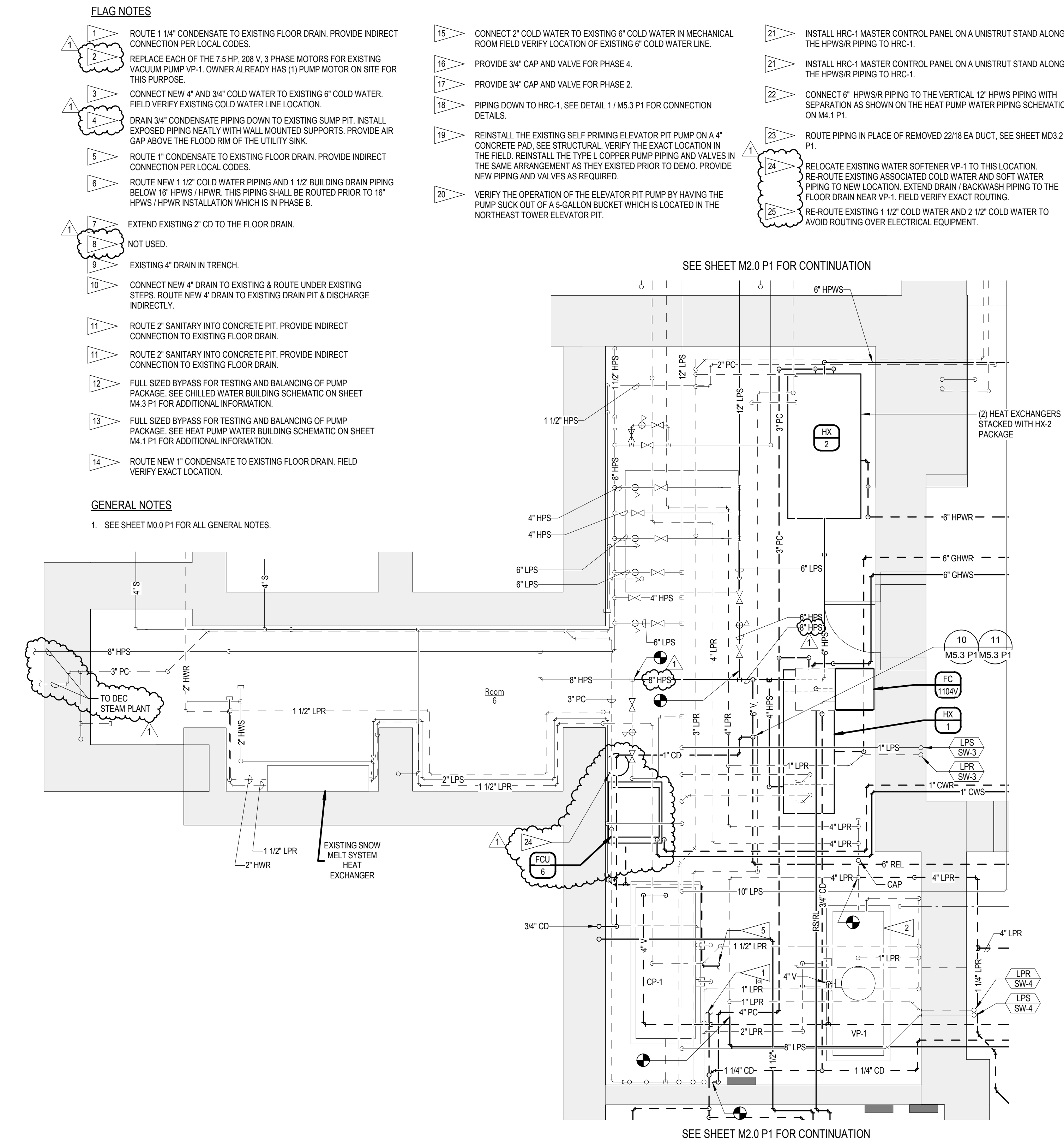
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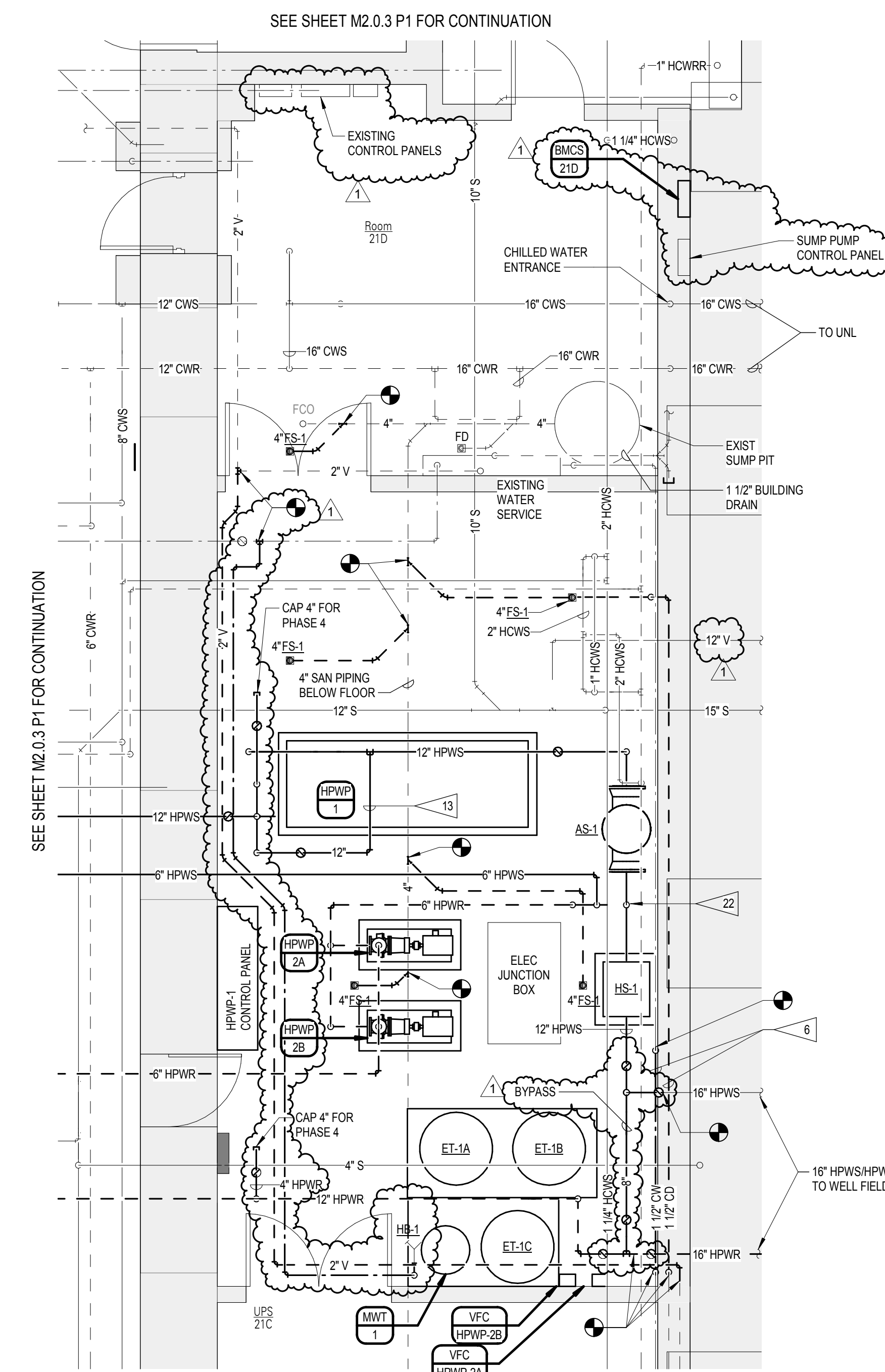
1 P1 PARTIAL ENLARGED MECHANICAL 39 FLOOR PLAN SOUTH - PIPING
1/4" = 1'-0"



4 P1 PARTIAL ENLARGED MECHANICAL 12E FLOOR PLAN - PIPING
1/4" = 1'-0"



2 P1 PARTIAL ENLARGED MECHANICAL 6 FLOOR PLAN - PIPING
1/4" = 1'-0"



3 P1 PARTIAL ENLARGED MECHANICAL 21 FLOOR PLAN - PIPING
1/4" = 1'-0"

FLAG NOTES

- ROUTE 1 1/4" CONDENSATE TO EXISTING FLOOR DRAIN. PROVIDE INDIRECT CONNECTION PER LOCAL CODES.
- REPLACE EACH OF THE 7 5 HP, 208 V, 3 PHASE MOTORS FOR EXISTING VACUUM PUMP VP-1. OWNER ALREADY HAS (1) PUMP MOTOR ON SITE FOR THIS PURPOSE.
- CONNECT NEW 4" AND 3/4" COLD WATER TO EXISTING 6" COLD WATER. FIELD VERIFY EXISTING COLD WATER LINE LOCATION.
- DRAIN 3/4" CONDENSATE PIPING DOWN TO EXISTING SUMP PIT. INSTALL EXPOSED PIPING NEATLY WITH WALL MOUNTED SUPPORTS. PROVIDE AIR GAP ABOVE THE FLOOD RM OF THE UTILITY SKN.
- ROUTE 1" CONDENSATE TO EXISTING FLOOR DRAIN. PROVIDE INDIRECT CONNECTION PER LOCAL CODES.
- ROUTE NEW 1 1/2" COLD WATER PIPING AND 1 1/2" BUILDING DRAIN PIPING BELOW 12" HPWS / HPWR. THIS PIPING SHALL BE ROUTED PRIOR TO 12" HPWS / HPWR INSTALLATION WHICH IS IN PHASE 6.
- EXTEND EXISTING 2" CD TO THE FLOOR DRAIN.
- NOT USED.
- EXISTING 4" DRAIN IN TRENCH.
- CONNECT NEW 4" DRAIN TO EXISTING 4" ROUTE UNDER EXISTING STEPS. ROUTE NEW 4" DRAIN TO EXISTING DRAIN PIT & DISCHARGE INDIRECTLY.
- ROUTE 2" SANITARY INTO CONCRETE PIT. PROVIDE INDIRECT CONNECTION TO EXISTING FLOOR DRAIN.
- ROUTE 2" SANITARY INTO CONCRETE PIT. PROVIDE INDIRECT CONNECTION TO EXISTING FLOOR DRAIN.
- FULL SIZED BYPASS FOR TESTING AND BALANCING OF PUMP PACKAGE. SEE CHILLED WATER BUILDING SCHEMATIC ON SHEET M3.3 P1 FOR ADDITIONAL INFORMATION.
- FULL SIZED BYPASS FOR TESTING AND BALANCING OF PUMP PACKAGE. SEE HEAT PUMP WATER BUILDING SCHEMATIC ON SHEET M4.1 P1 FOR ADDITIONAL INFORMATION.
- ROUTE NEW 1" CONDENSATE TO EXISTING FLOOR DRAIN. FIELD VERIFY EXACT LOCATION.

GENERAL NOTES

- SEE SHEET M0.0 P1 FOR ALL GENERAL NOTES.

SEE SHEET M2.0 P1 FOR CONTINUATION

SEE SHEET M2.0 P1 FOR CONTINUATION

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NEBRASKA STATE CAPITOL HVAC
REPLACEMENT AND WINDOW
RESTORATION

PROJECT: OCC 2014405
BVH 1.14077
DATE: APRIL 23, 2018

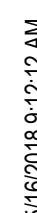


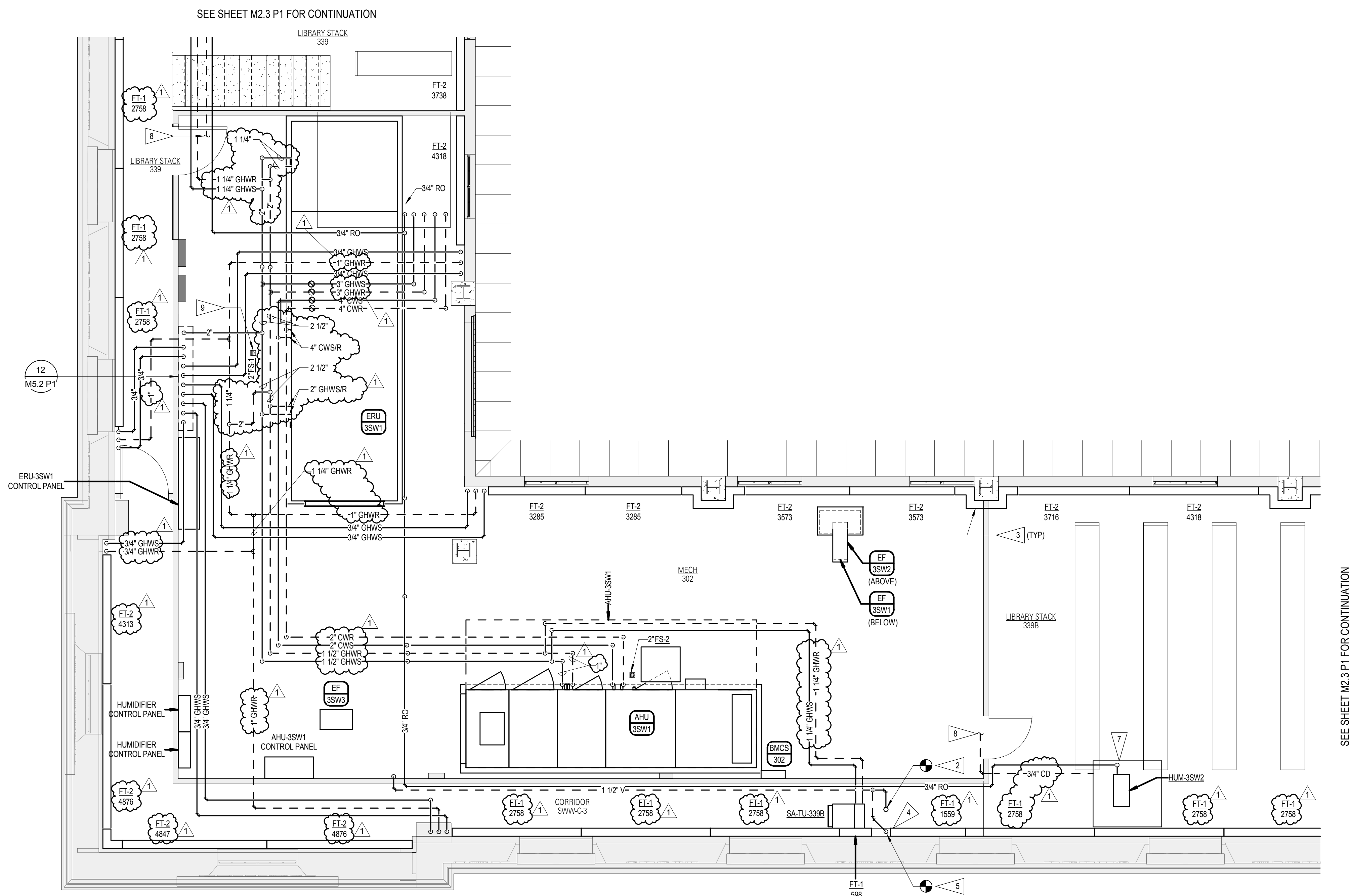
04/23/2018

ENLARGED MECHANICAL PLANS

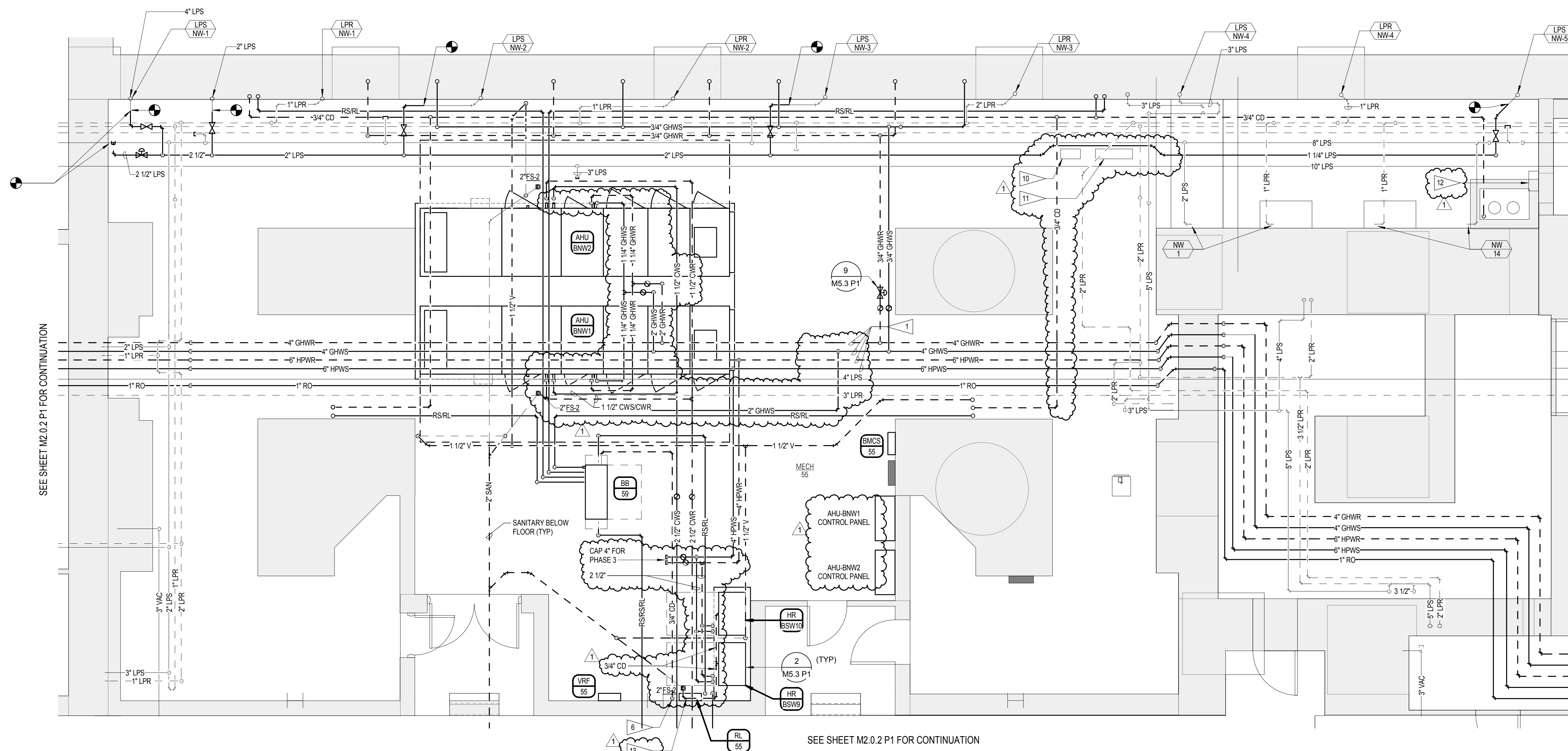
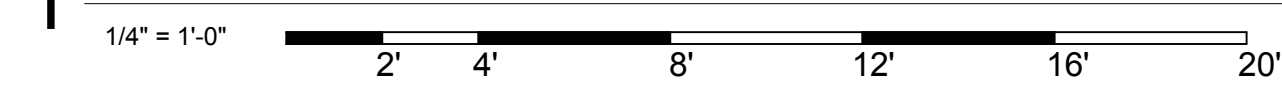
NORTH
1

M3.5
P1





1 P1 PARTIAL ENLARGED MECHANICAL 302 FLOOR PLAN - PIPING



2 P1 PARTIAL ENLARGED MECHANICAL 59 FLOOR PLAN - PIPING



GENERAL NOTES

- SEE SHEET M0.0 P1 FOR ALL GENERAL NOTES.

FLAG NOTES

- STACK PIPING IN MECHANICAL ROOM. SHOWN FOR CLARITY.
- CONNECT NEW 1 1/2\" VENT PIPING INTO EXISTING 2\" VENT. FIELD VERIFY EXISTING EXACT LOCATION.
- WRAP GHWS / R PIPING TIGHT AROUND COLUMN / CORNER.
- PROVIDE FINTURE COVER BETWEEN SECTIONS OF ACTIVE FINTURE SECTIONS TO ENCAPSULATE EXISTING 2\" VENT PIPING.
- RE-ROUTE EXISTING 2\" VENT BELOW DUCTWORK.
- ROUTE 3/4\" CONDENSATE DOWN ALONG WALL AND TO FLOOR SINK.
- PROVIDE 3/4\" CONDENSATE DRAIN TO STAINLESS STEEL DUCT SECTION.
- ROUTE CONDENSATE TO NEAREST FLOOR SINK.
- FLOOR SINK SHOWN PER CLARITY HOWEVER, LOCATE FLOOR SINK NEXT TO THE COOLING COIL CONDENSATE DRAIN FOR ERU-35W1.
- EXISTING BMCS CONTROL PANEL FOR THE FOUNTAIN EQUIPMENT.
- EXISTING FOUNTAIN EQUIPMENT CONTROL PANEL.
- EXISTING SLUMP PUMP CONTROL PANEL.
- ROUTE TO CONDENSATE TIGHT TO WALL AND THEN OVER TO THE FLOOR SINK.

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REVISIONS SCHEDULE		
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1	5/16/2018	ADDENDUM #5

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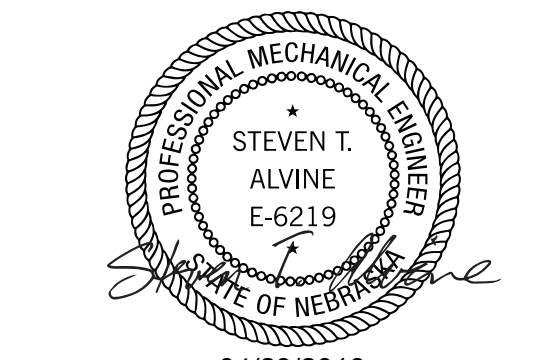
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NEBRASKA STATE CAPITOL HVAC REPLACEMENT AND WINDOW RESTORATION

PROJECT: OCC 2014485 BVH 1.14077 DATE: APRIL 23 2018

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04/23/2018

ENLARGED MECHANICAL PLANS

NORTH

1

M3.8
P1

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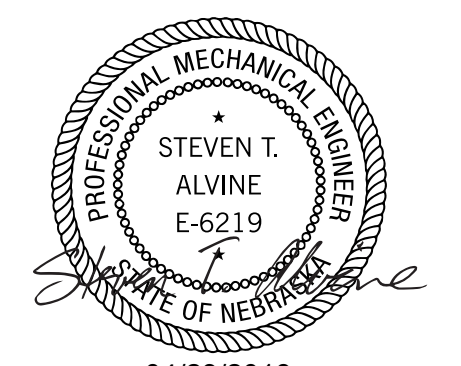
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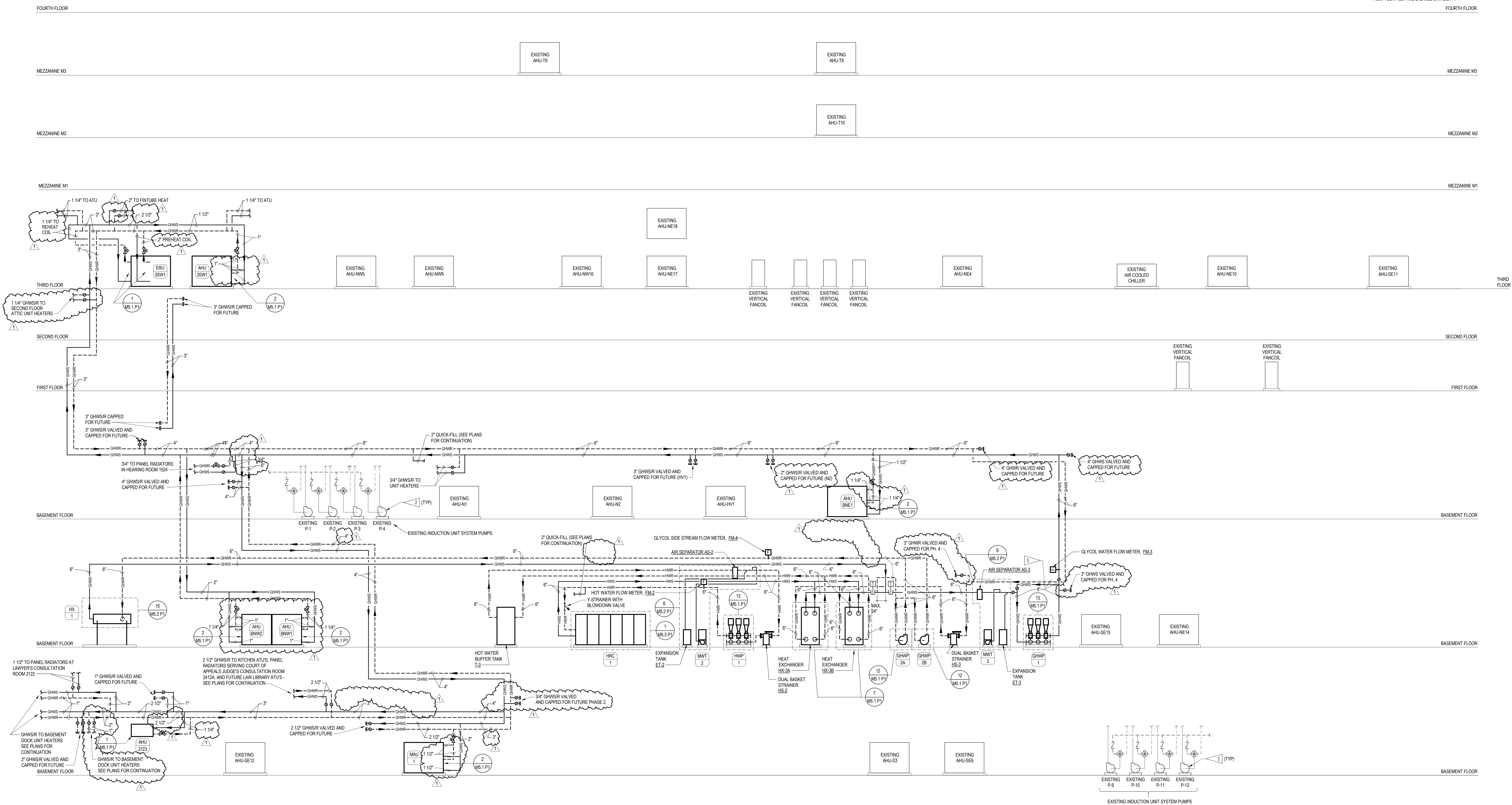
NEBRASKA STATE CAPITOL HVAC
REPLACEMENT AND WINDOW
RESTORATION

PROJECT: OCC 2014485 DATE: APRIL 23 2018
BVH 114077



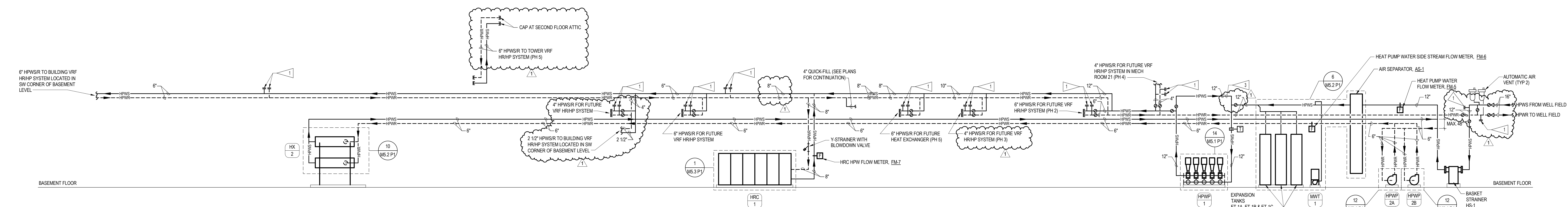
MECHANICAL SCHEMATICS

- GENERAL NOTES**
- SEE SHEET M0.0 P1 FOR ALL GENERAL NOTES.
 - ALL DRAIN LINES SHALL BE PIPED TO FLOOR DRAIN OR HAVE HOSE END CONNECTIONS.
 - COORDINATE LOCATION OF ALL SENSORS WITH ENGINEER.
 - ALL STRAINERS SHALL HAVE BALL TYPE BLOWDOWN VALVES WITH HOSE END CONNECTIONS.
 - SEE PLANS FOR ROUTING AND SIZE OF PIPING OUTSIDE OF MECHANICAL ROOM.
 - PROVIDE LOOPS FOR THERMAL EXPANSION AS NEEDED FOR SYSTEM MOVEMENT.
- FLAG NOTES**
- PROVIDE PRESSURE AND TEMPERATURE SENSOR PLUGS.
 - PROVIDE ENGINEER WRITTEN TEST AND BALANCE REPORT OF EXISTING WATER FLOW PUMP MOTOR PERFORMANCE AND NAMEPLATE DATA BEFORE AND MODIFICATION TO SYSTEM.
 - PROVIDE FULL SIZED BYPASS PIPING FROM SUPPLY LINE TO RETURN LINE UPSTREAM OF PUMP BMD TO PROVIDE FULL PUMP FLOW TEST AND BALANCE CAPABILITY.



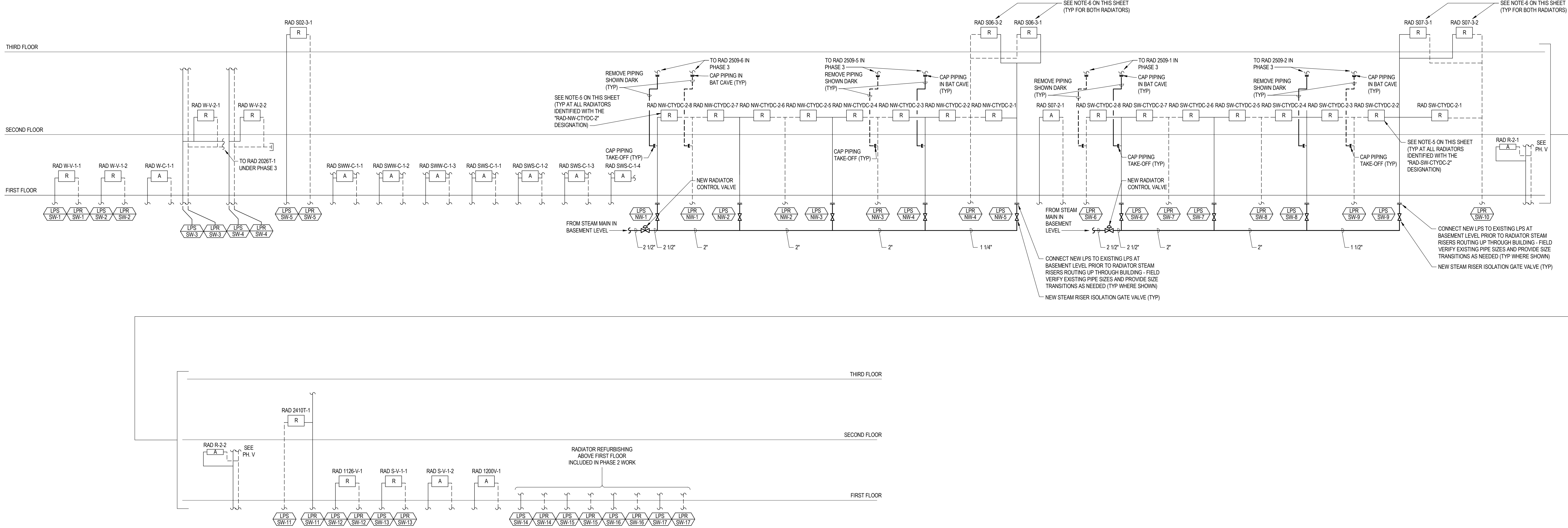
HEATING HOT WATER AND GLYCOL HOT WATER PIPING SCHEMATIC

NO SCALE

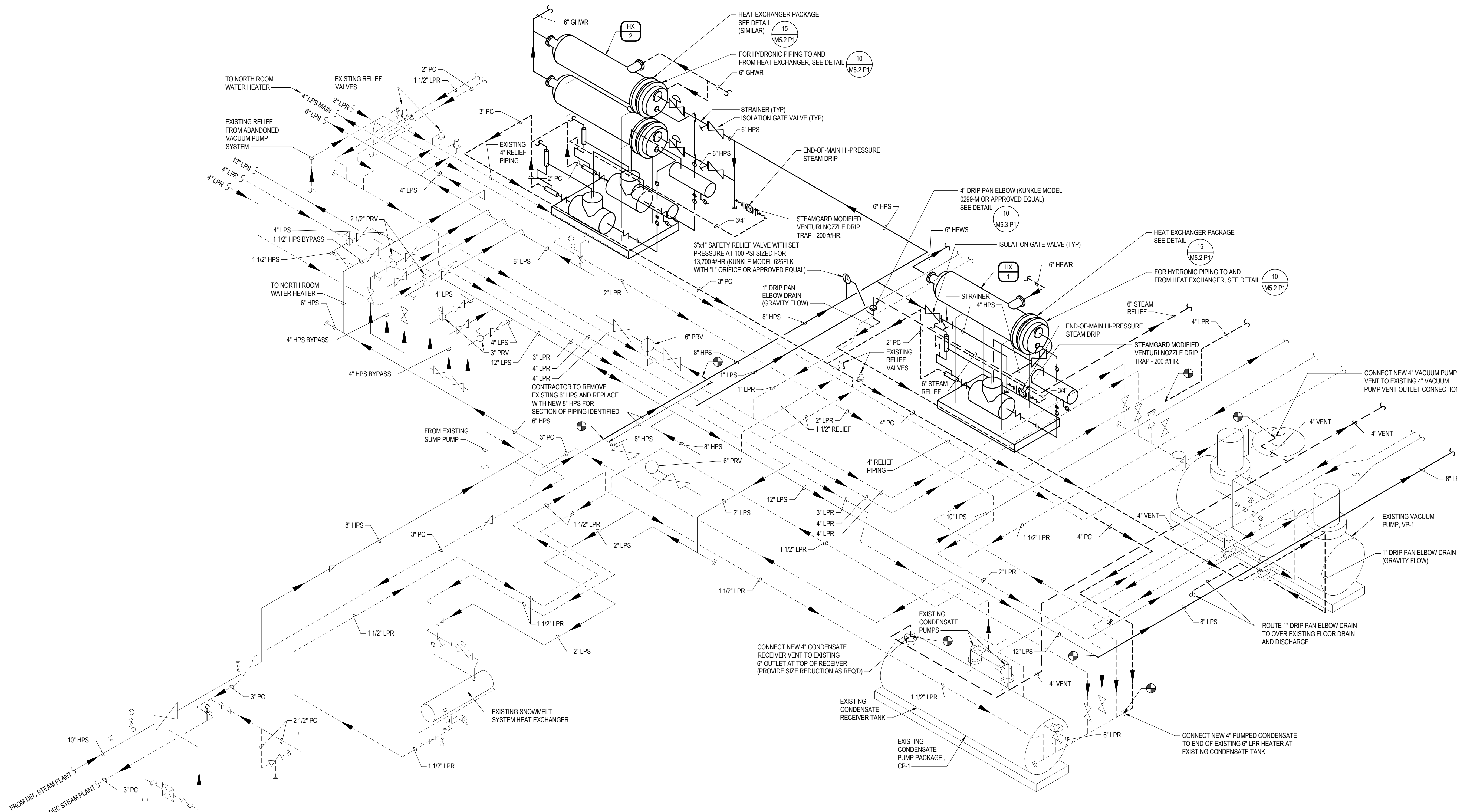


HEAT PUMP WATER PIPING SCHEMATIC

NO SCALE



STEAM SYSTEM PIPING RISER - PHASE 1
NO SCALE



STEAM SYSTEM PIPING ISOMETRIC - ROOM 6
NO SCALE

GENERAL NOTES

- RADIATORS INDICATED ON THIS RISER DIAGRAM ARE EXISTING RADIATORS THAT WILL EITHER BE ABANDONED IN PLACE OR REFURBISHED AND REUSED. RADIATORS THAT WILL BE ABANDONED IN PLACE ARE IDENTIFIED WITH AN "A" INSIDE EACH RADIATOR AND RADIATORS THAT WILL BE REFURBISHED AND REUSED ARE IDENTIFIED WITH AN "R" INSIDE EACH RADIATOR.
- RADIATOR STEAM SUPPLY AND CONDENSATE RETURN RISERS FOR RADIATORS THAT WILL BE ABANDONED IN PLACE ARE NOT LABELED ON THE RISER DIAGRAM. THESE RISERS WILL BE ABANDONED IN PLACE. THE MECHANICAL CONTRACTOR SHALL DISCONNECT THE PIPE RISERS FROM THE STEAM PIPING AND CONDENSATE RETURN PIPING AT THE BASEMENT LEVEL AND SHALL CAP THE REMAINING RISERS LEAVING A SEALED, NON-CHECK PIPE CONDITION. SEE FLOOR PLANS FOR WORK AT BASEMENT LEVEL.
- EXISTING RADIATOR STEAM SUPPLY AND CONDENSATE RETURN RISERS SERVING RADIATORS THAT WILL REMAIN AND BE REFURBISHED ARE PROVIDED WITH RISER TAGS MATCHING THOSE SHOWN ON THE FLOOR PLAN DRAWINGS. THE MECHANICAL CONTRACTOR SHALL DISCONNECT THE EXISTING PIPING RISERS SERVING THE RADIATORS FROM THE EXISTING BASEMENT LEVEL STEAM SUPPLY AND CONDENSATE RETURN PIPING AND CONNECT THE RISERS TO NEW PIPING INSTALLED UNDER PHASE 2 WORK. THE EXISTING PIPING CONDITION AT THE BASEMENT LEVEL WILL REMAIN INTACT THROUGH THE DURATION OF PHASE 1 WORK WITH THE BASEMENT LEVEL PIPING REMOVAL AND NEW INSTALLATION COMMENCING AT THE START OF THE PHASE 2 WORK.
- AT ALL RADIATORS TO REMAIN AND BE REUSED, MECHANICAL CONTRACTOR SHALL REMOVE EXISTING RADIATOR STEAM SUPPLY CONTROL VALVE, PIPING BUSHING, AND PIPE NIPPLE AT RADIATOR INLET LOCATION AND SHALL REMOVE CONDENSATE RETURN TRAP, PIPING BUSHING AND PIPE NIPPLE AT RADIATOR OUTLET LOCATION. MECHANICAL CONTRACTOR SHALL PROVIDE AND INSTALL NEW RADIATOR CONTROL VALVE, RADIATOR TRAP AND REQUIRED BUSHINGS AND PIPE NIPPLES TO PUT RADIATOR BACK INTO SATISFACTORY WORKING CONDITION. THIS WORK IS TYPICAL OF ALL EXISTING AND NEW RADIATORS ASSOCIATED WITH THE RADIATORS IDENTIFIED IN THE PHASE 1 WORK. SEE DETAIL M5.2 P1 ON MECHANICAL DRAWING M5.2 P1.
- AT EXISTING RADIATORS LOCATED AT THE SECOND FLOOR "HALL OF FAME" CORRIDORS AS THE FOLLOWING: RAD SW-CTYDC-2, RAD SW-CTYDC-3, RAD SW-CTYDC-4, RAD SW-CTYDC-5, RAD SW-CTYDC-6, RAD SW-CTYDC-7, RAD SW-CTYDC-8, RAD SW-CTYDC-9, RAD SW-CTYDC-10, RAD SW-CTYDC-11, RAD SW-CTYDC-12, RAD SW-CTYDC-13, RAD SW-CTYDC-14, RAD SW-CTYDC-15, RAD SW-CTYDC-16, RAD SW-CTYDC-17, RAD SW-CTYDC-18, RAD SW-CTYDC-19, RAD SW-CTYDC-20, RAD SW-CTYDC-21, RAD SW-CTYDC-22, RAD SW-CTYDC-23, RAD SW-CTYDC-24, RAD SW-CTYDC-25, RAD SW-CTYDC-26, RAD SW-CTYDC-27, RAD SW-CTYDC-28, RAD SW-CTYDC-29, RAD SW-CTYDC-30, RAD SW-CTYDC-31, RAD SW-CTYDC-32, RAD SW-CTYDC-33, RAD SW-CTYDC-34, RAD SW-CTYDC-35, RAD SW-CTYDC-36, RAD SW-CTYDC-37, RAD SW-CTYDC-38, RAD SW-CTYDC-39, RAD SW-CTYDC-40, RAD SW-CTYDC-41, RAD SW-CTYDC-42, RAD SW-CTYDC-43, RAD SW-CTYDC-44, RAD SW-CTYDC-45, RAD SW-CTYDC-46, RAD SW-CTYDC-47, RAD SW-CTYDC-48, RAD SW-CTYDC-49, RAD SW-CTYDC-50, RAD SW-CTYDC-51, RAD SW-CTYDC-52, RAD SW-CTYDC-53, RAD SW-CTYDC-54, RAD SW-CTYDC-55, RAD SW-CTYDC-56, RAD SW-CTYDC-57, RAD SW-CTYDC-58, RAD SW-CTYDC-59, RAD SW-CTYDC-60, RAD SW-CTYDC-61, RAD SW-CTYDC-62, RAD SW-CTYDC-63, RAD SW-CTYDC-64, RAD SW-CTYDC-65, RAD SW-CTYDC-66, RAD SW-CTYDC-67, RAD SW-CTYDC-68, RAD SW-CTYDC-69, RAD SW-CTYDC-70, RAD SW-CTYDC-71, RAD SW-CTYDC-72, RAD SW-CTYDC-73, RAD SW-CTYDC-74, RAD SW-CTYDC-75, RAD SW-CTYDC-76, RAD SW-CTYDC-77, RAD SW-CTYDC-78, RAD SW-CTYDC-79, RAD SW-CTYDC-80, RAD SW-CTYDC-81, RAD SW-CTYDC-82, RAD SW-CTYDC-83, RAD SW-CTYDC-84, RAD SW-CTYDC-85, RAD SW-CTYDC-86, RAD SW-CTYDC-87, RAD SW-CTYDC-88, RAD SW-CTYDC-89, RAD SW-CTYDC-90, RAD SW-CTYDC-91, RAD SW-CTYDC-92, RAD SW-CTYDC-93, RAD SW-CTYDC-94, RAD SW-CTYDC-95, RAD SW-CTYDC-96, RAD SW-CTYDC-97, RAD SW-CTYDC-98, RAD SW-CTYDC-99, RAD SW-CTYDC-100.
- AT EXISTING RADIATORS, THE MECHANICAL CONTRACTOR SHALL REMOVE EXISTING SELF-REGULATING CONTROL VALVE AT EACH RADIATOR AND PROVIDE NEW PIPING BUSHINGS AND PIPE ELBOWS PROVIDING A FREE FLOW OF STEAM IN THE SUPPLY PIPING TO THE RADIATOR. THE MECHANICAL CONTRACTOR SHALL REMOVE AND REPLACE THE RADIATOR STEAM TRAP. CONTROL OF RADIATORS FOR HALL OF FAME CORRIDORS SHALL BE THROUGH NEW CONTROL VALVE LOCATED AT THE BASEMENT LEVEL PROVIDING CONTROL OF HALL OF FAME CORRIDOR RADIATORS AT FLOOR BELOW.

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NEBRASKA STATE CAPITOL HVAC
REPLACEMENT AND WINDOW
RESTORATION

PROJECT: OCC 2014405
BVH 1.14077
DATE: APRIL 23, 2018

STEVEN T. ALVINE
E-6219
04/23/2018

MECHANICAL SCHEMATICS

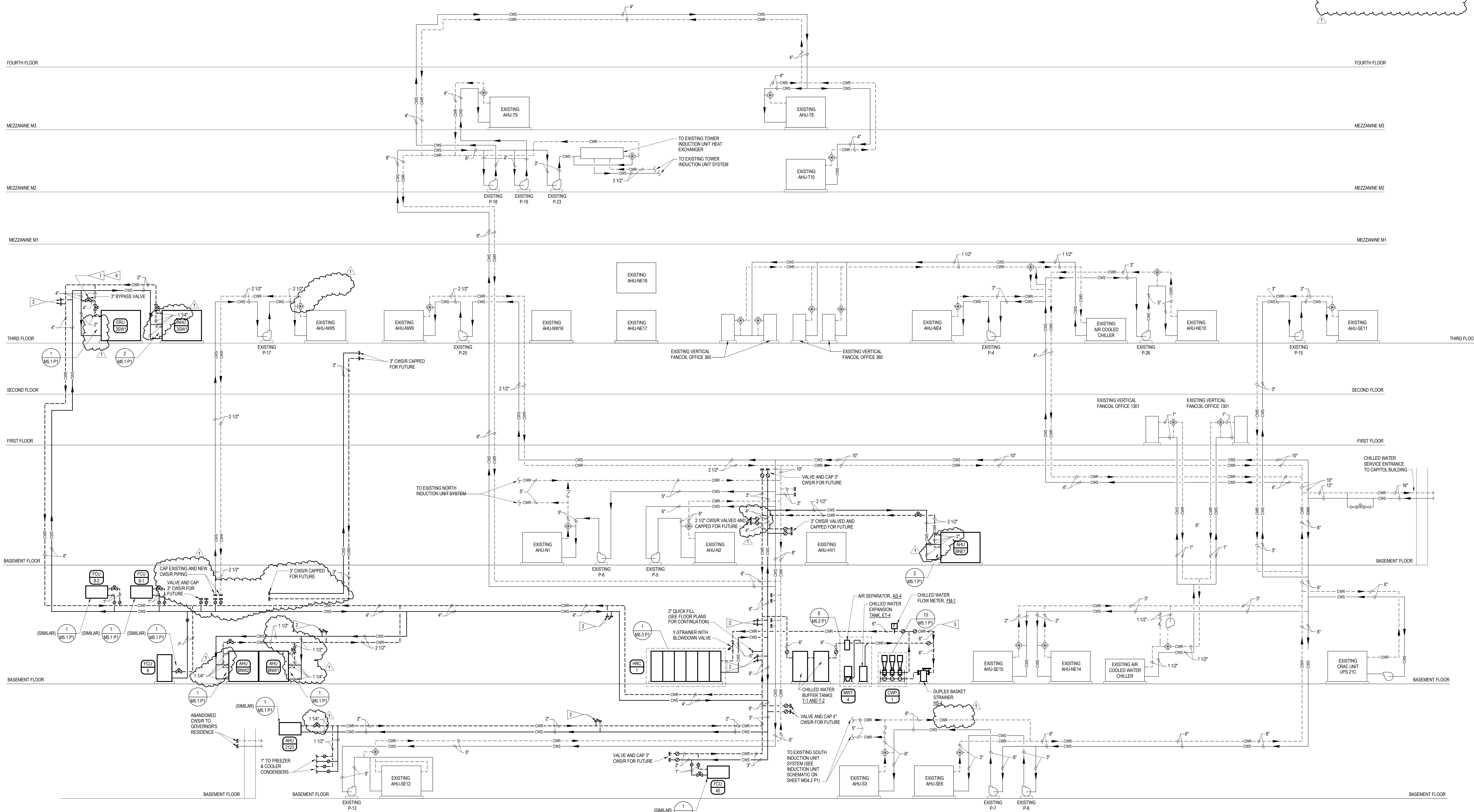
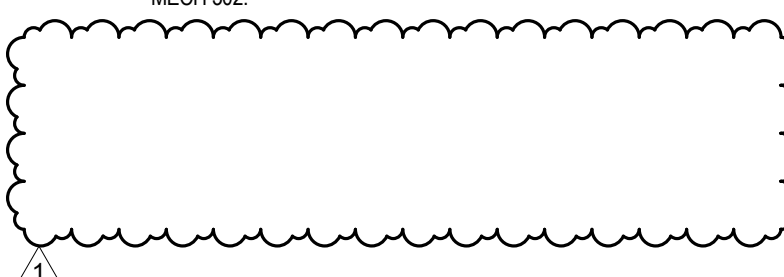
M4.2
P1

GENERAL NOTES

- SEE SHEET M4.0 P1 FOR ALL GENERAL NOTES.

FLAG NOTES

- TWO-WAY PRESSURE DEPENDENT BYPASS VALVE - SEE DETAIL #1 ON SHEET M4.1 P1 FOR DETAILED VALVE INFORMATION. PROVIDE PRESSURE AND TEMPERATURE SENSOR PLUGS.
- PROVIDE FULL SIZED BYPASS PIPING FROM SUPPLY LINE TO RETURN LINE UPSTREAM OF PUMP BOX TO PROVIDE FULL PUMP FLOW TEST AND BALANCE CAPABILITY.
- CHILLED WATER PIPING SYSTEM DIFFERENTIAL PRESSURE SENSOR SHALL NOT BE LOCATED IN BOX 302 AND SHALL BE A MINIMUM OF 100 LINEAR FEET AWAY FROM MECH 302.



CHILLED WATER PIPING SCHEMATIC
NO SCALE

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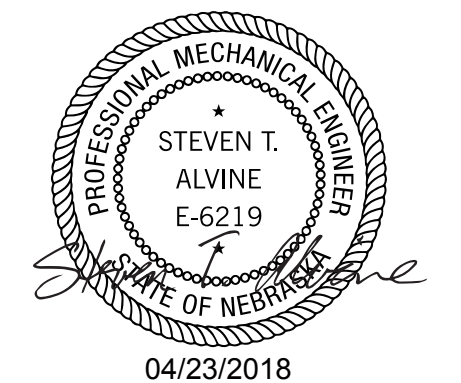
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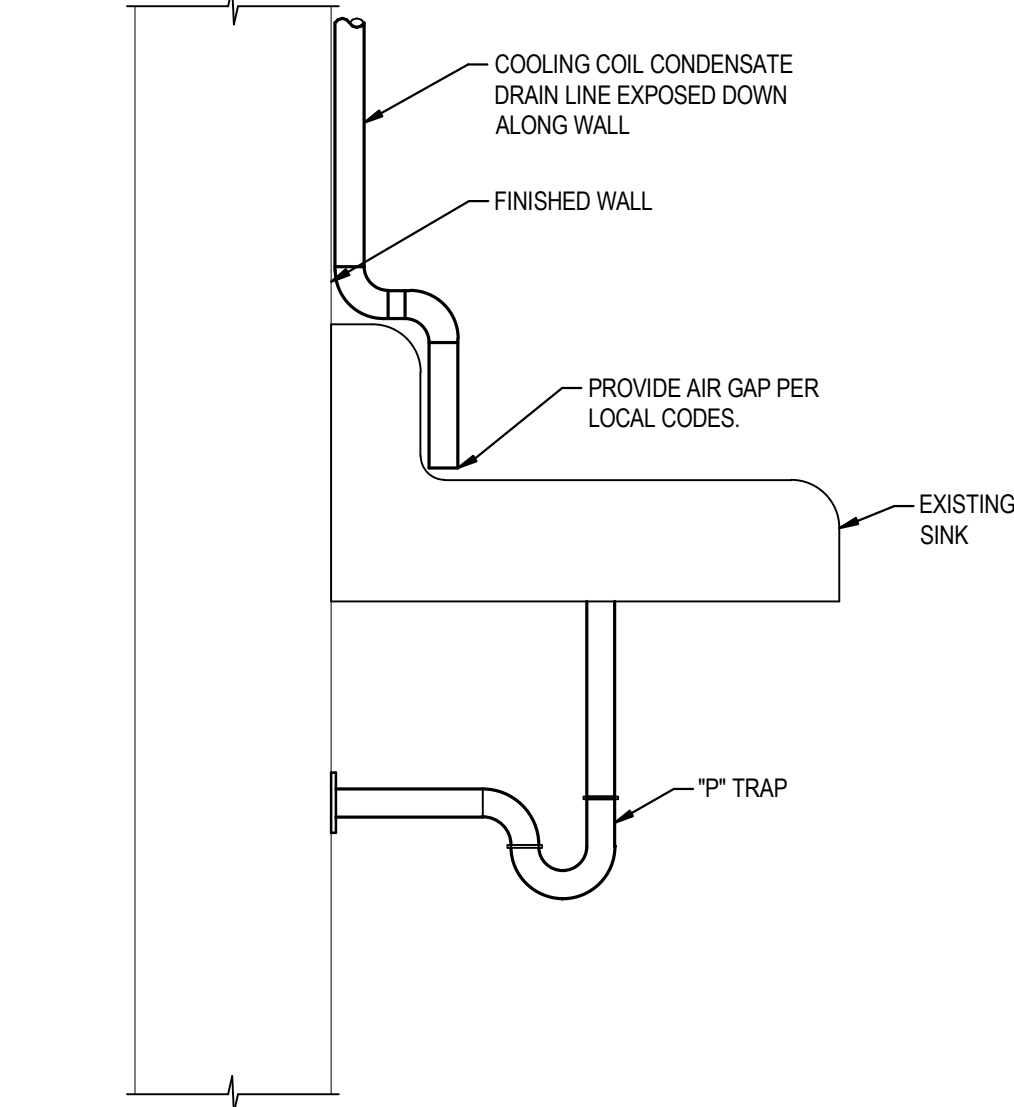
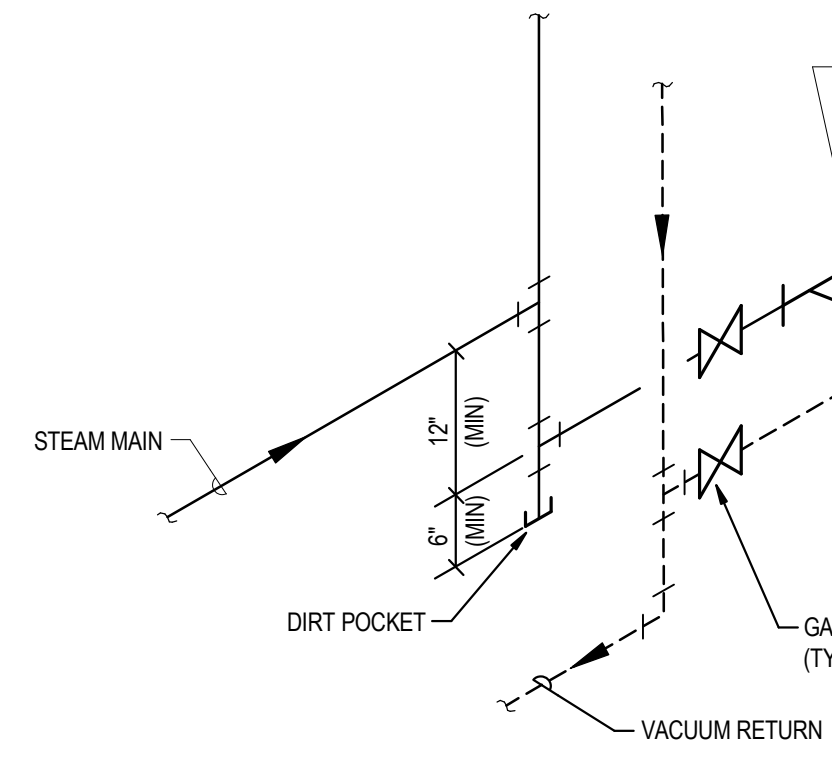
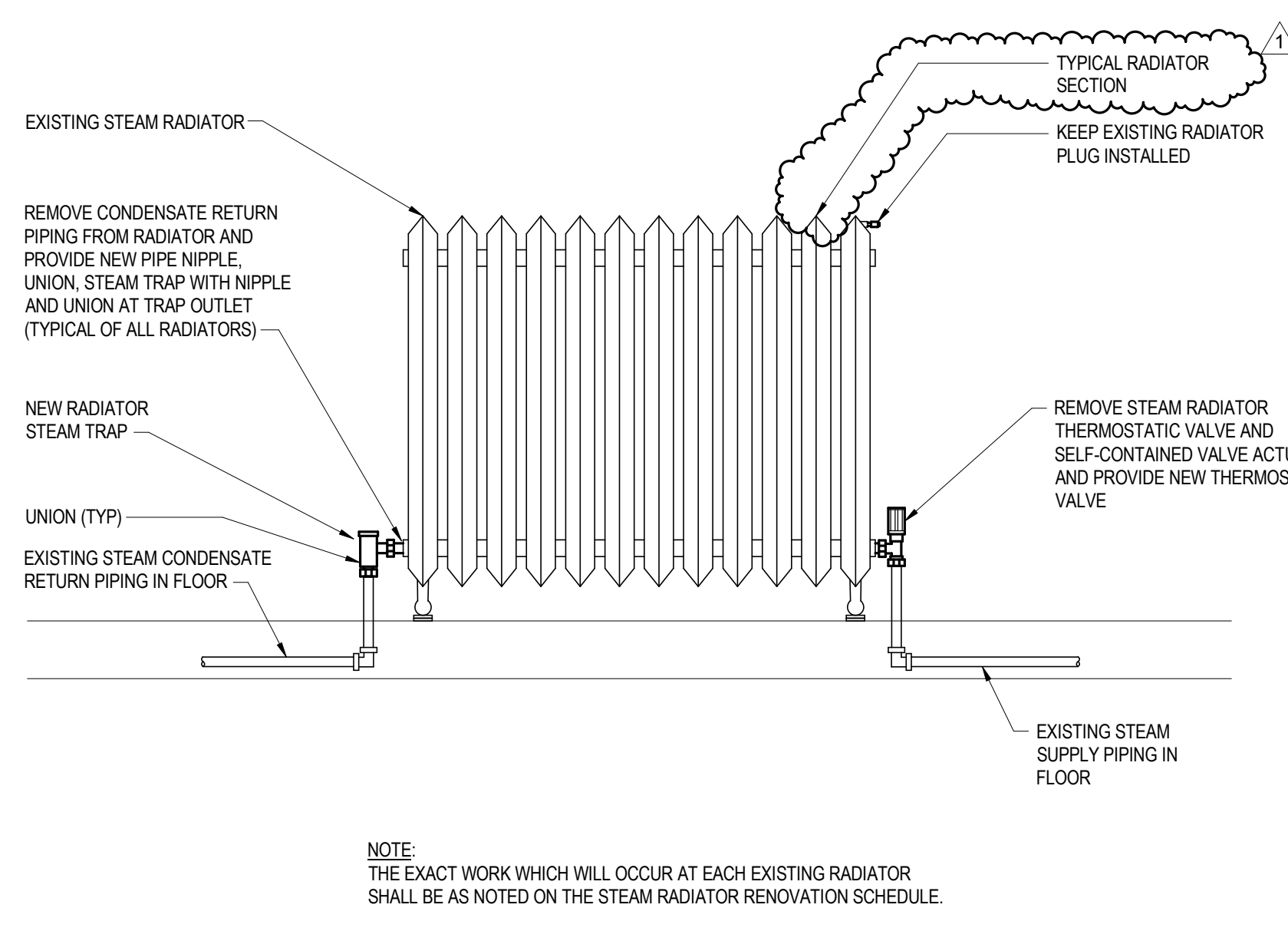
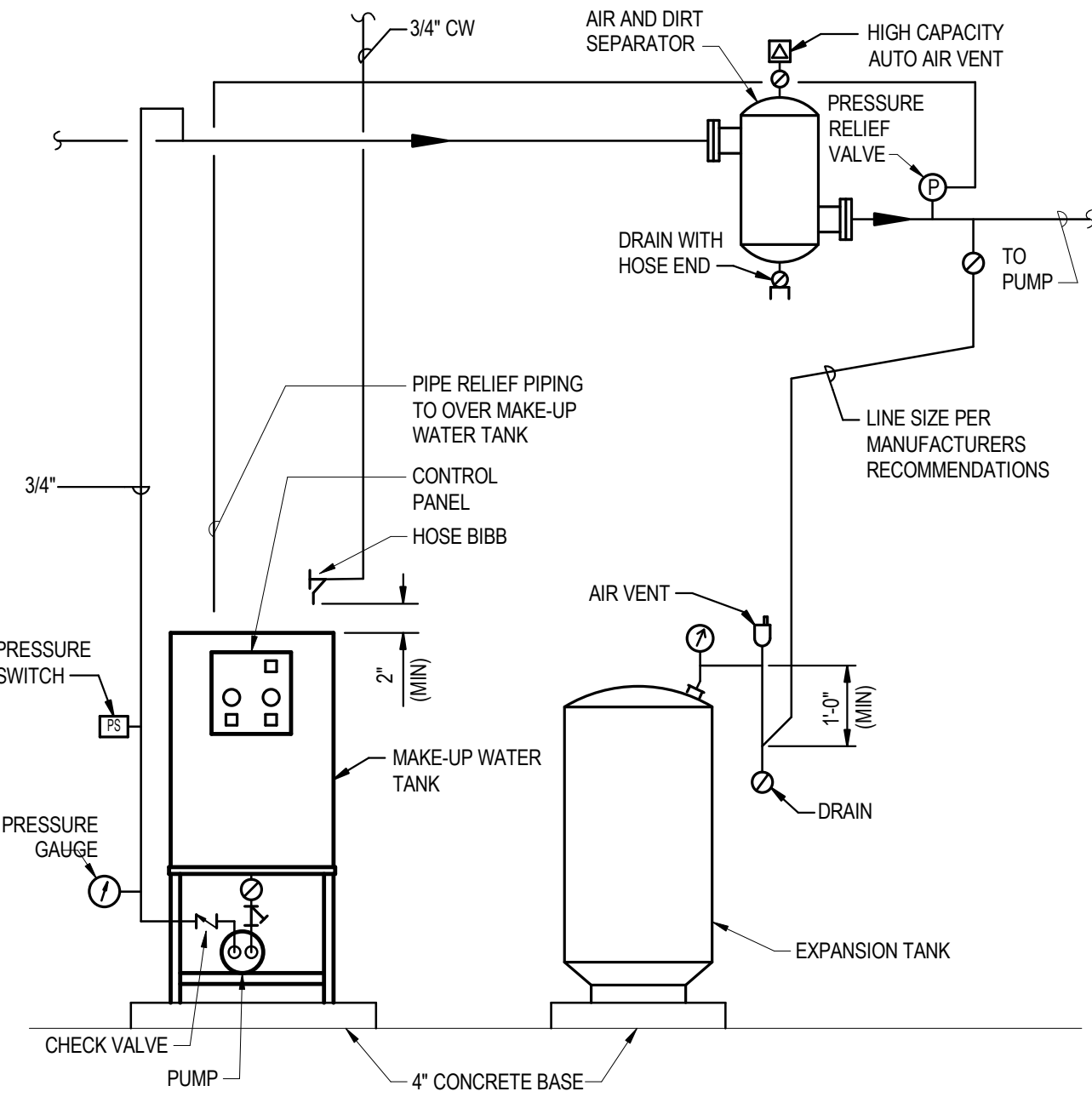
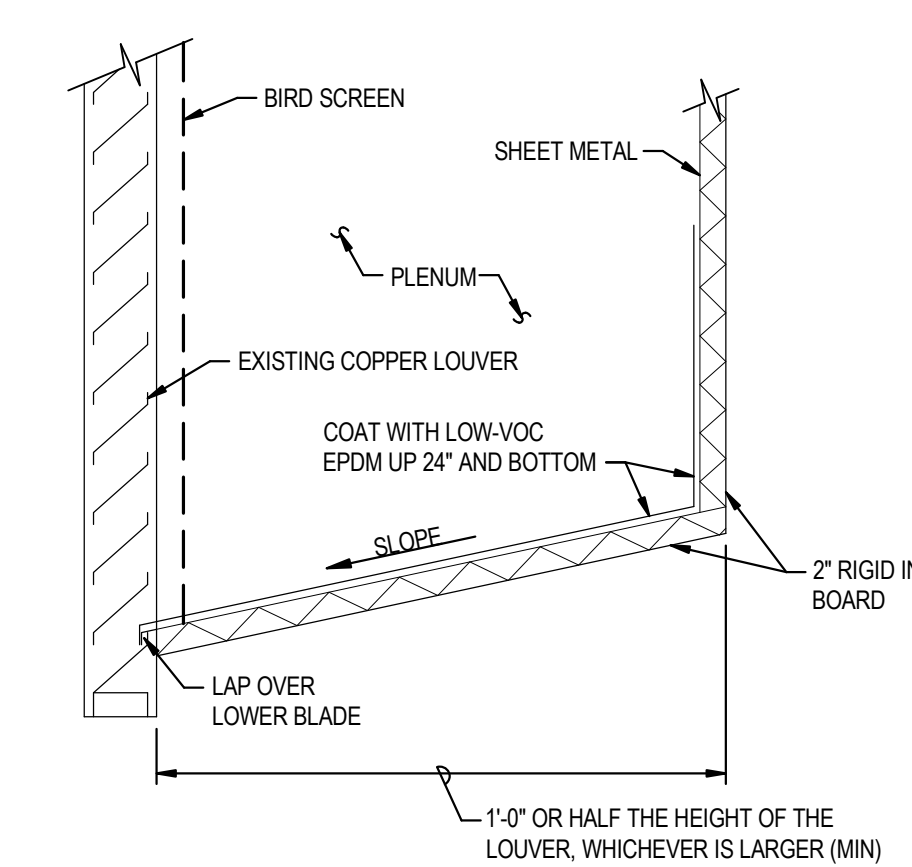
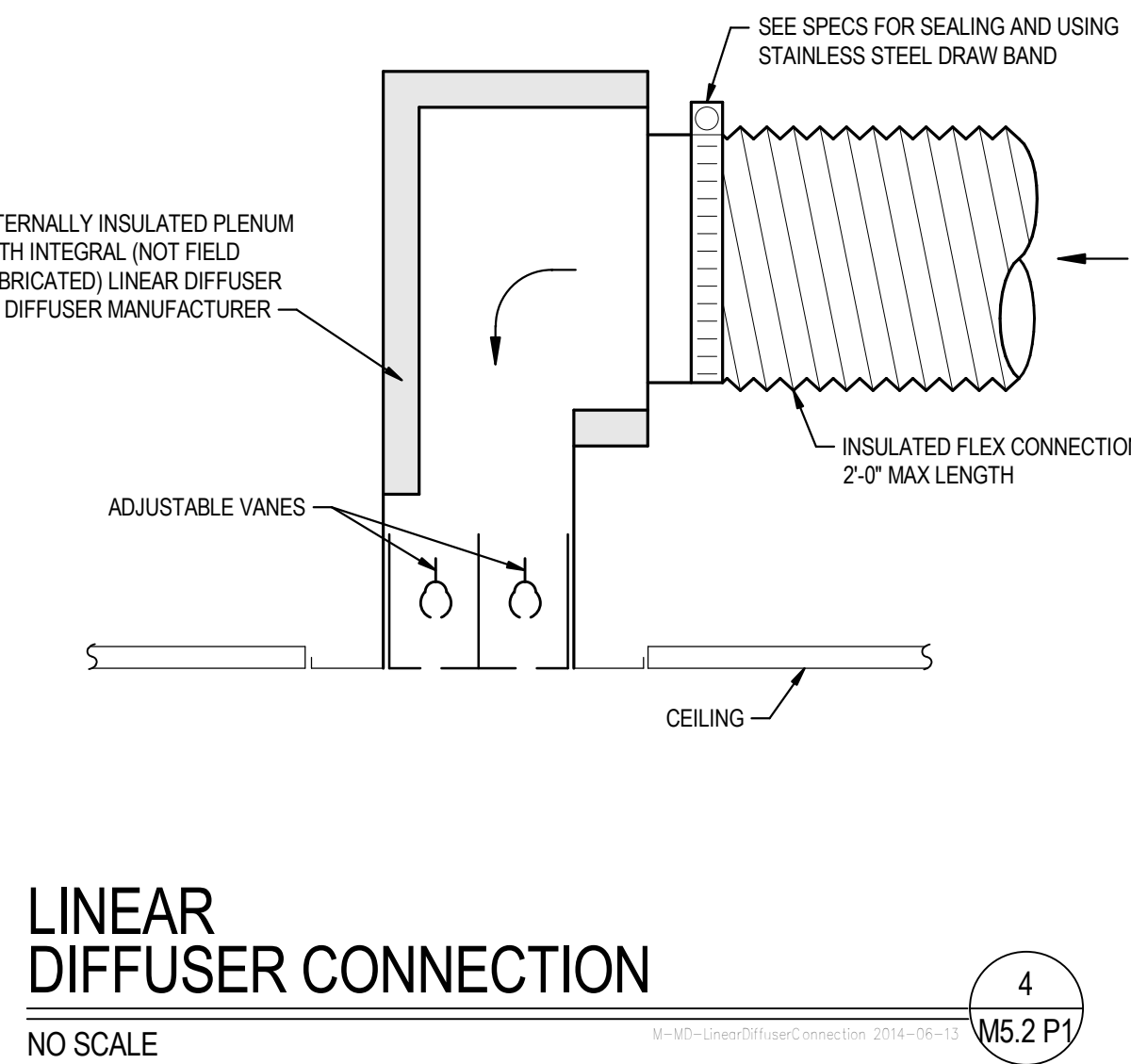
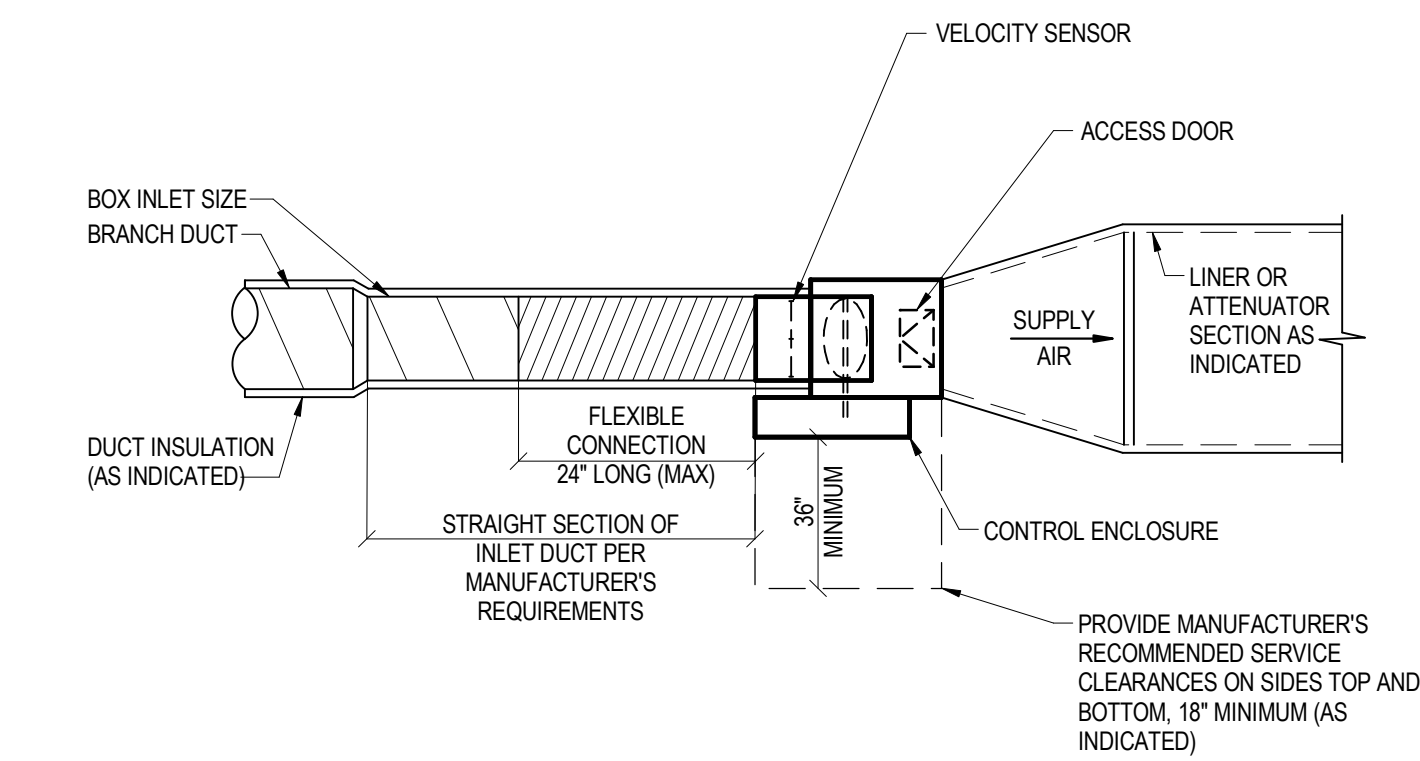
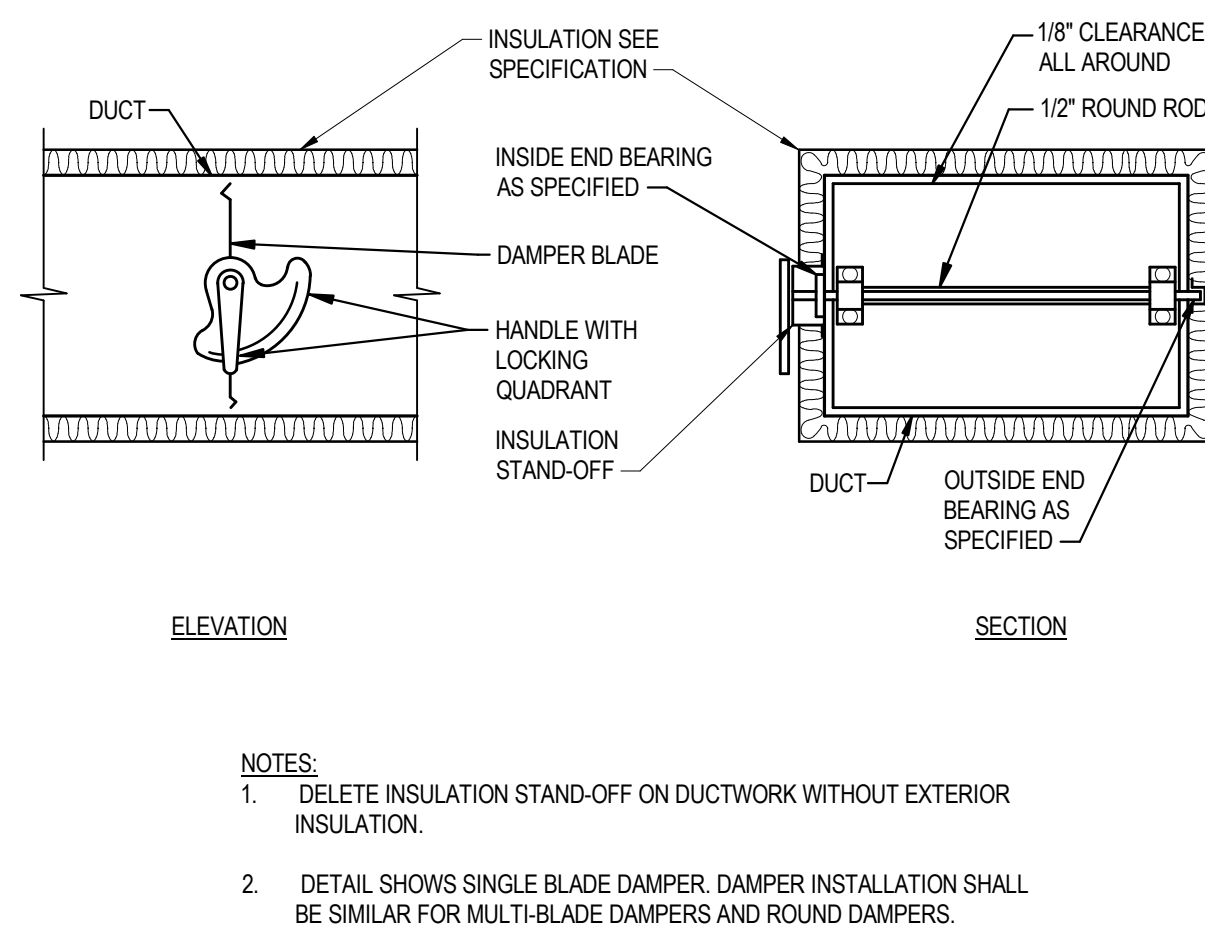
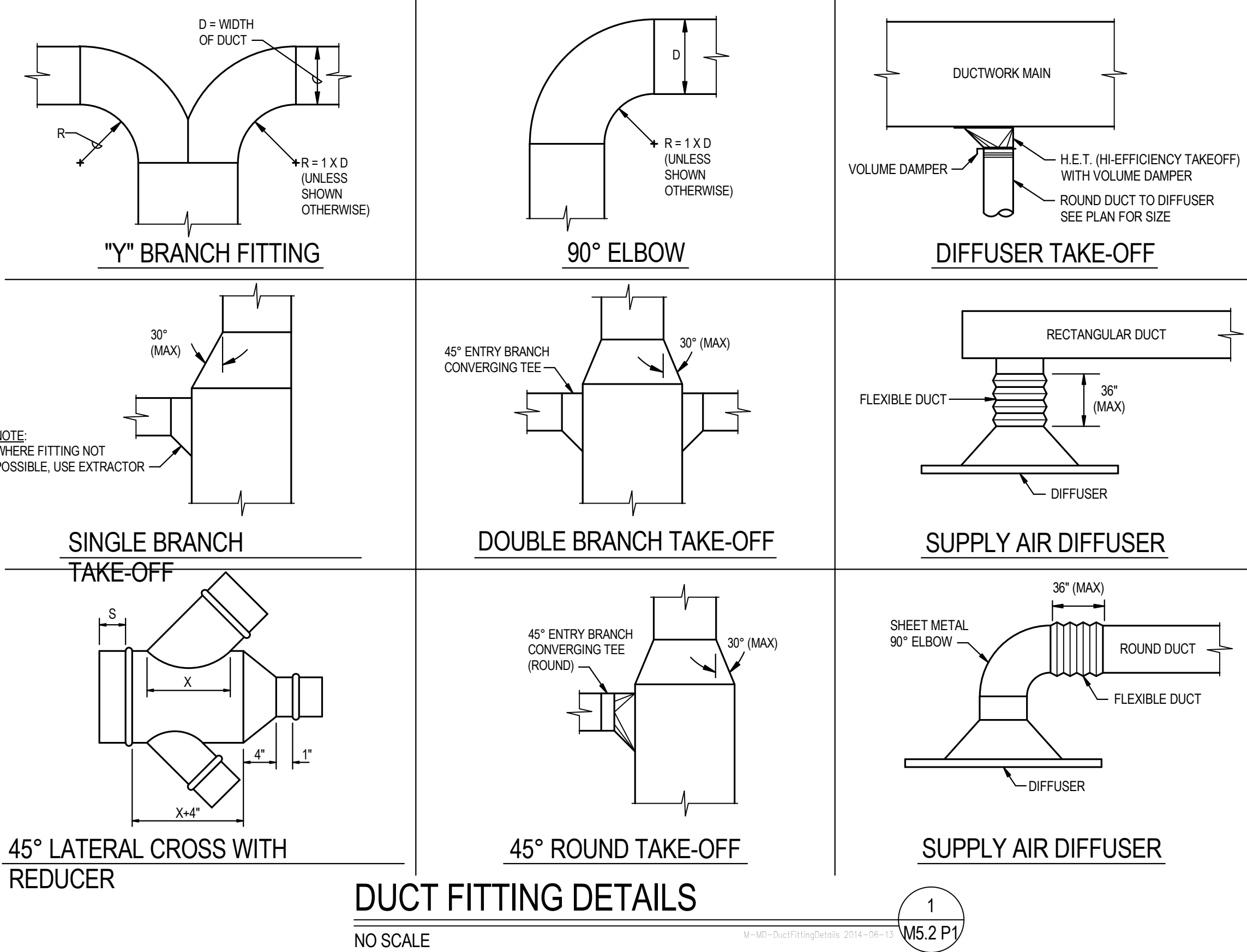
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NEBRASKA STATE CAPITOL HVAC
REPLACEMENT AND WINDOW
RESTORATION

PROJECT: OCC 201445
BVH 1.14077
DATE: APRIL 23 2018



MECHANICAL SCHEMATICS



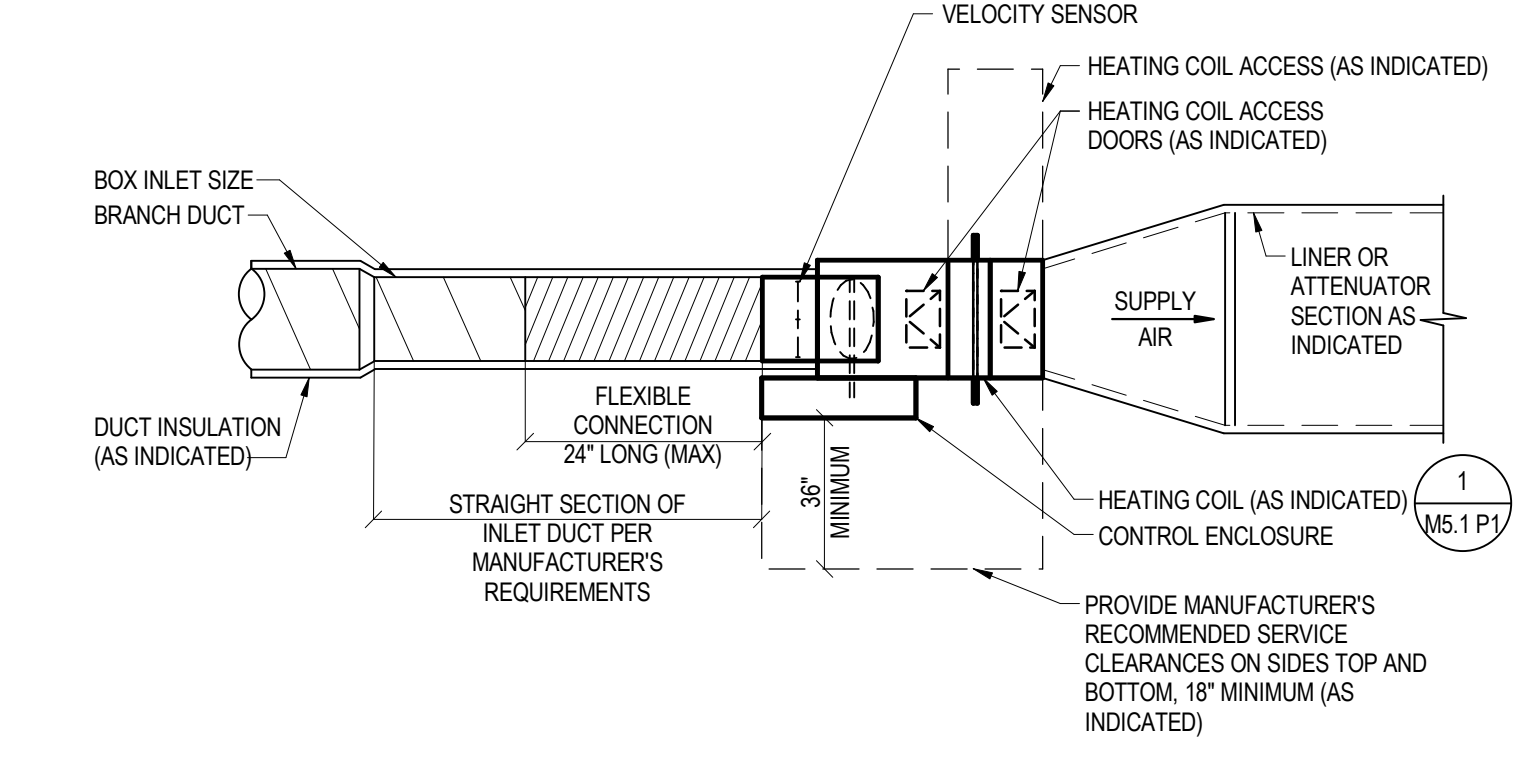
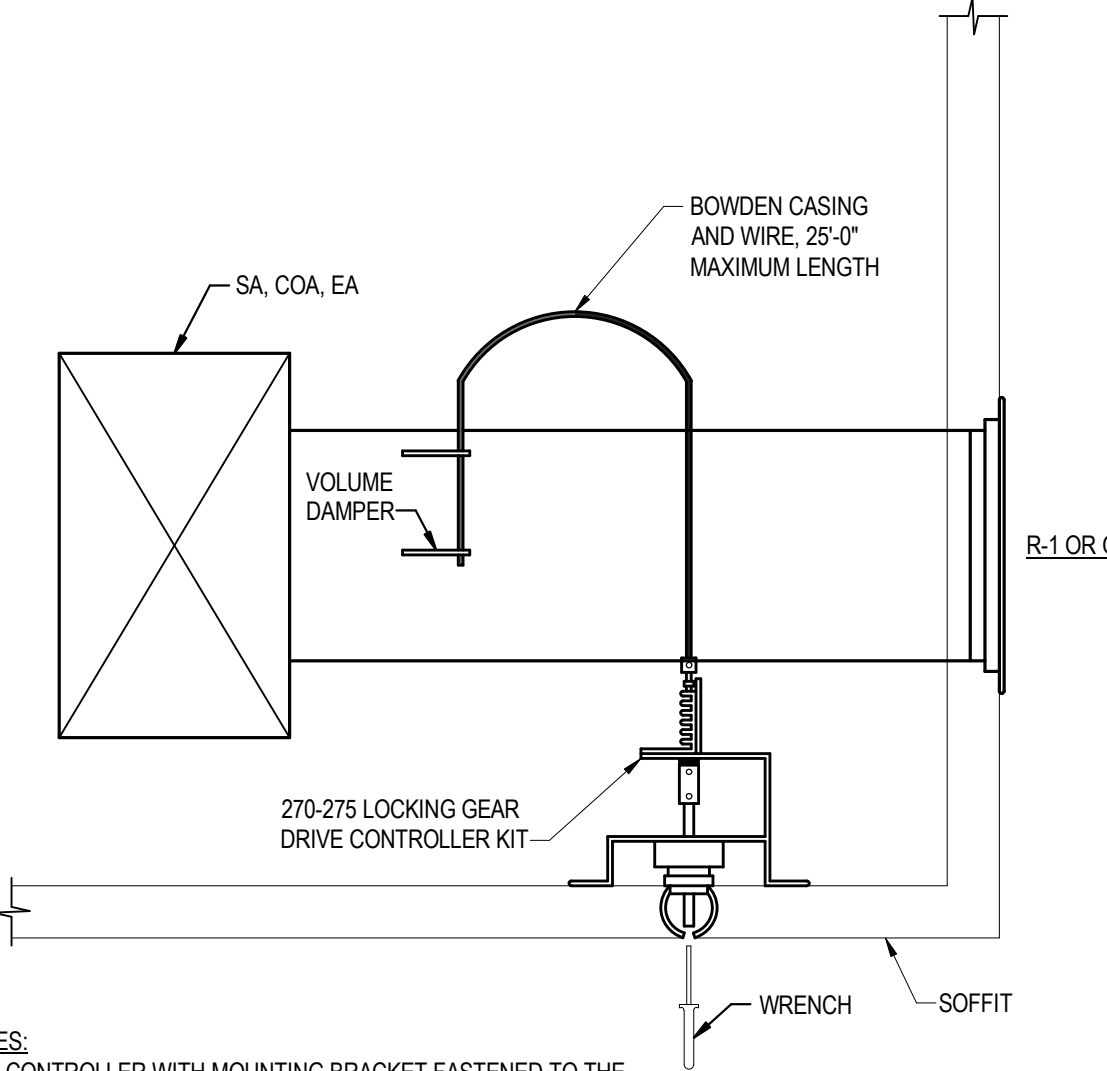
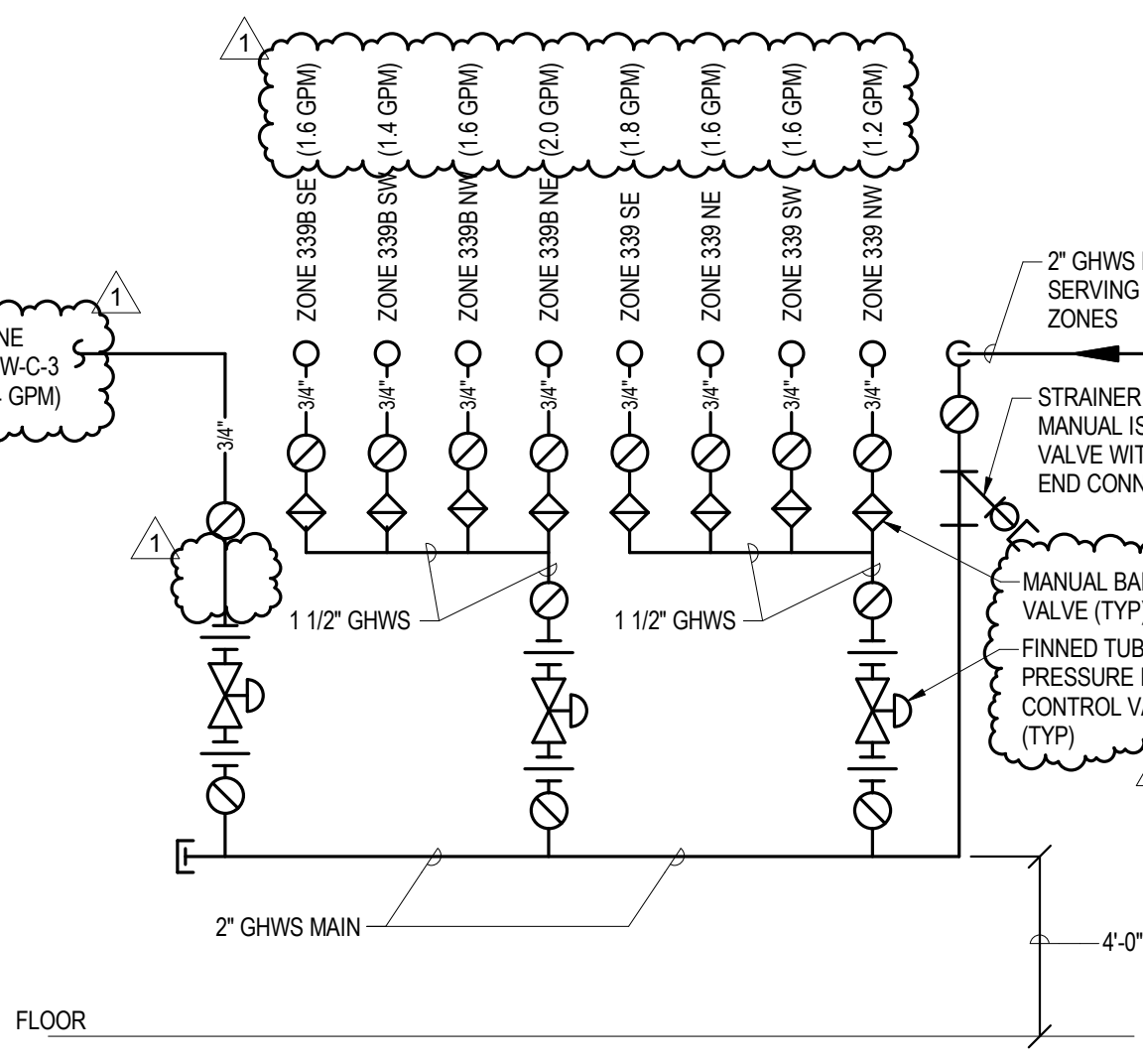
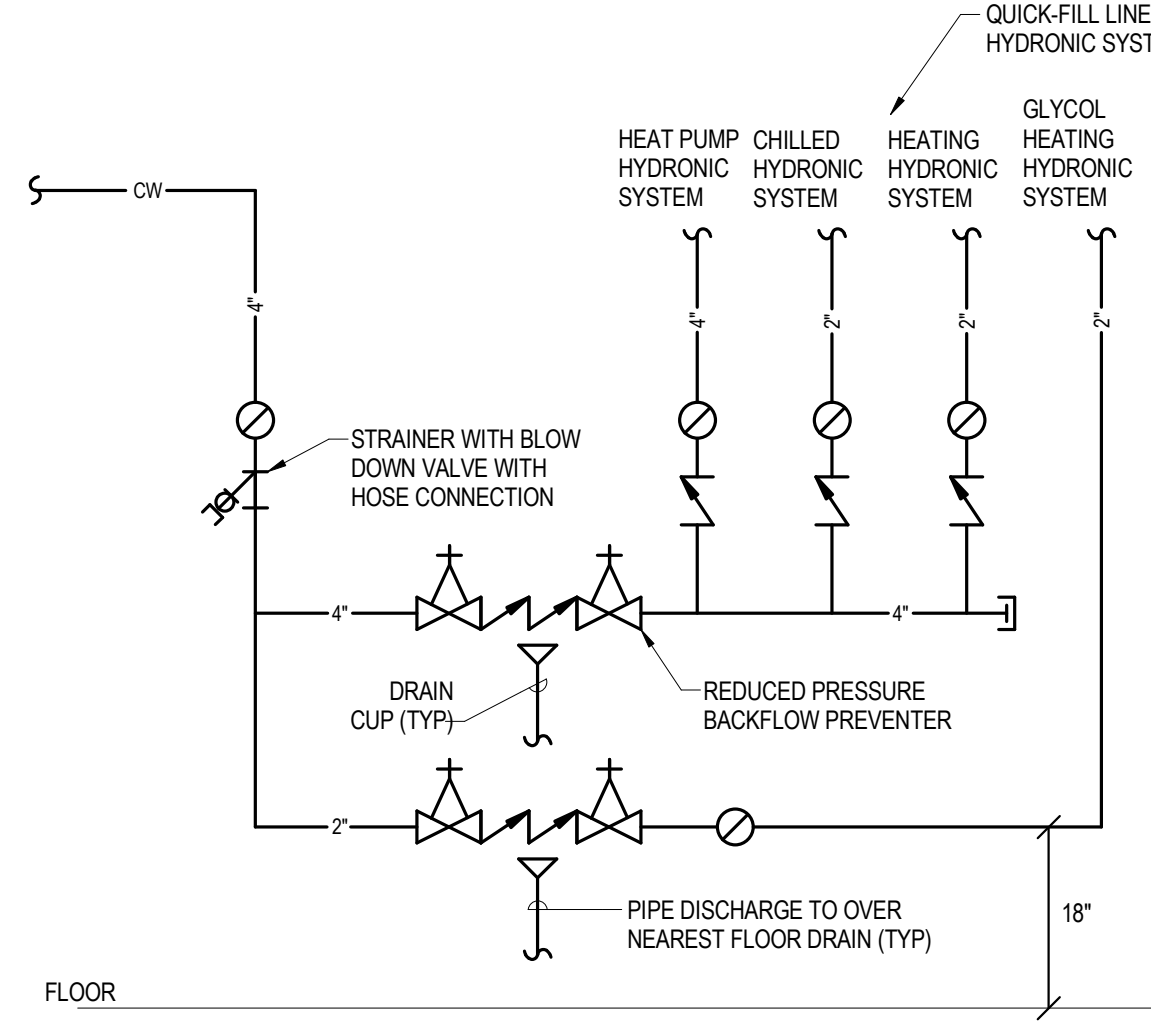
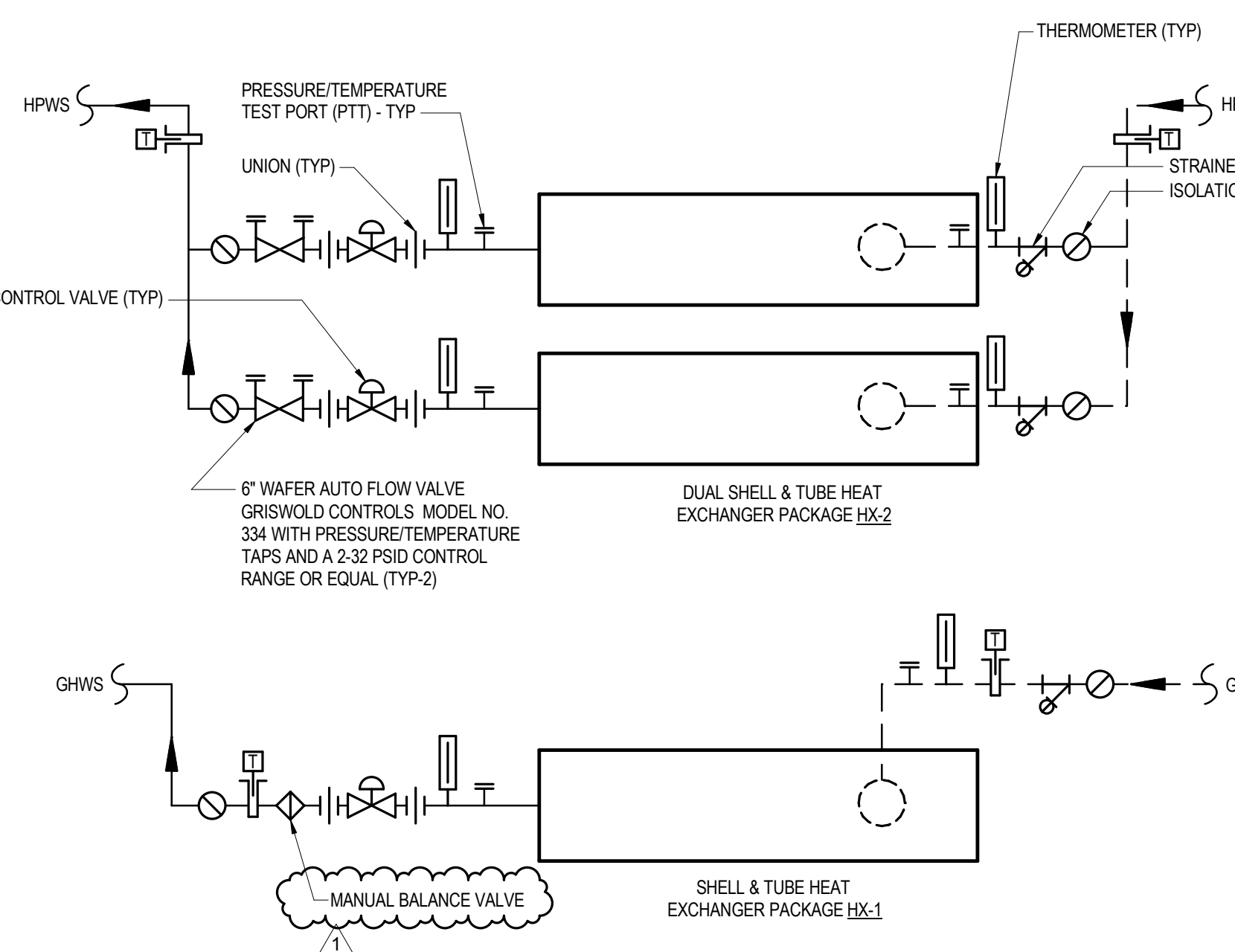
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MAKE-UP WATER AND AIR ELIMINATION

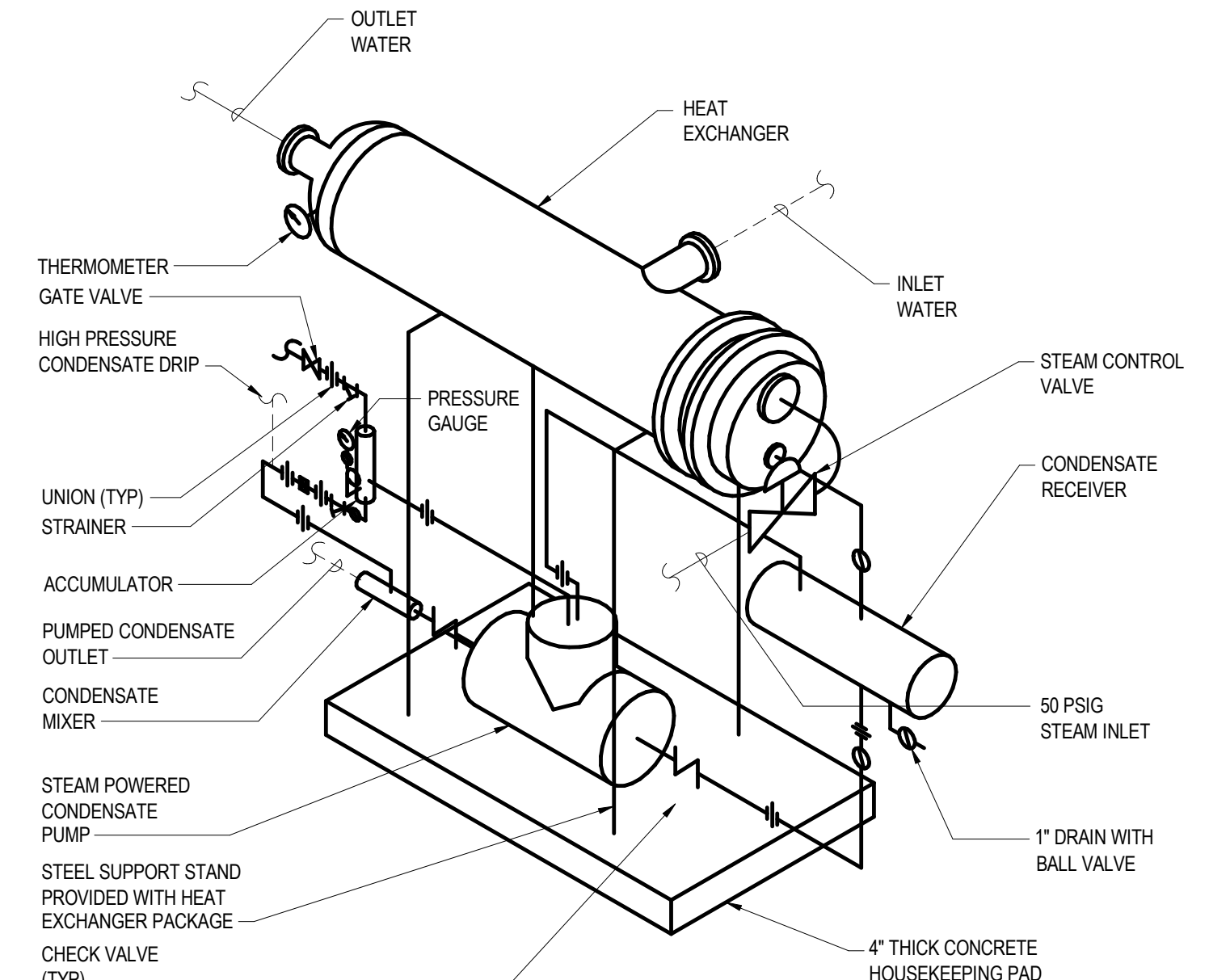
STEAM RADIATOR DETAIL

TRAP AT END OF STEAM MAIN/RISER

CONDENSATE DRAIN LINE CONNECTION



SINGLE DUCT AIR TERMINAL UNIT WITH REHEAT



STEAM HEAT EXCHANGER PACKAGE

SHELL & TUBE HEAT EXCHANGER WATER CONNECTIONS

HYDRONIC SYSTEM QUICK-FILL PIPING

FINNED TUBE CONTROL VALVE PIPING DETAIL

REMOTE VOLUME DAMPER CONTROL

REVISIONS SCHEDULE		
MARK	DATE	DESCRIPTION
1	5/16/2018	ADDENDUM #5

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NEBRASKA STATE CAPITOL HVAC REPLACEMENT AND WINDOW RESTORATION

PROJECT: OCC 2014405
BVIH.114077
DATE: APRIL 23, 2018



MECHANICAL DETAILS

M5.2 P1

REVISIONS SCHEDULE		
MARK	DATE	DESCRIPTION
1	15/02/2018	ADDENDUM #5

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NEBRASKA STATE CAPITOL HVAC
PROJECT AND WINDOW
RESTORATION

OCCT 201405
BVH 11/01/77
DATE: APRIL 23, 2018



04/23/2018

MECHANICAL SCHEDULES

HYDRONIC STRAINER SCHEDULE (PHASE 1)										
MARK	SERVES	TYPE	FLOW (GPM)	MAX PD (FT)	STRAINER PIPE SIZE (IN)	MESH	MANUFACTURER	MODEL	REMARKS	
HS-1	HPWSR	SINGLE BASKET	3100	3.0	12	40	EATON	73	(1)	
HS-2	DUAL BASKET	DUAL BASKET	400	3.0	6	40	EATON	50	(1)	
HS-3	CHWSR	DUAL BASKET	720	3.0	6	40	EATON	50	(1)(2)	
HS-4	CHWSR	DUAL BASKET	680	3.0	6	40	EATON	50	(1)	

- REMARKS:
1. PROVIDE STRAINER WITH REMOVABLE 40 MESH LINER BASKET.
 2. PRESSURE DROP INCLUDES ALLOWANCE FOR 40% PROPYLENE GLYCOL / 60% WATER SOLUTION.

MAKEUP WATER TANK & PUMP SCHEDULE (PHASE 1)

MARK	SERVES	TANK SIZE (GALLONS)	GPM	HEAD (PSI)	MANUFACTURER	MODEL	REMARKS
MWT-1	HEAT PLUMP WATER SYSTEM	50	1.70	50	J. WINGERT	TOLSB-E1UBIC	(1) (2) (3)
MWT-2	HEATING HOT WATER SYSTEM	50	1.70	50	J. WINGERT	TOLSB-E1UBIC	(1) (2) (3)
MWT-3	GLYCOL HEATING HOT WATER SYSTEM	50	1.70	50	J. WINGERT	TOLSB-E1UBIC	(1) (2) (3)
MWT-4	CHILLED WATER SYSTEM	50	1.70	50	J. WINGERT	TOLSB-E1UBIC	(1) (2) (3)

- REMARKS:
1. SEE MECHANICAL/ELECTRICAL COORDINATION SCHEDULE ON SHEET E6.1 P1 FOR ELECTRICAL DATA.
 2. PROVIDE TANK/PUMP PACKAGE WITH 4.5 GALLON DAPHA/BAK EXPANSION TANK MOUNTED ON BOTTOM OF TANK FRAM. DIGITAL PRESSURE SWITCH, TANK AND STAND, ALULBIE ALARM AND SILENCE SWITCH, HEATER, WATER LEVEL, BELL CONTACT FOR CONNECTION TO BMCS, PRESSURE RELIEF VALVE, AND SCHEDULE 40 GAL VANDER STEEL HIGH TEMPERATURE MANIFOLD WITH HIGH TEMPERATURE HOSES.
 3. PACKAGE SERVICES WATER SYSTEM.
 4. PACKAGE SERVICES WATER/GLYCOL SYSTEM.

MARK	DESCRIPTION	DEFLECTION	MAX S.P. (IN. W.C.)	MAX NC LEVEL	CONSTRUCTION MATERIAL	FINISH	FACE SIZE (IN)	MANUFACTURER	MODEL	ACCESSORIES	REMARKS
D-1	PLAQUE	ANY	0.10	25	STEEL	(2)	24x24	KRUEGER	PLO	-	(1)
LD-1	LINEAR	ADJUSTABLE	0.10	25	ALUMINUM	(2)	80" LONG	KRUEGER	19T5	-	(1)(2)
LD-2	LINEAR	ADJUSTABLE	0.10	25	ALUMINUM	(2)	SEE PLANS	KRUEGER	19T5	-	(1)(2)
R-1	ADJUSTABLE	DOUBLE	0.10	25	STEEL	(2)	12x8	KRUEGER	880H	-	(1)(7)
R-2	ADJUSTABLE	DOUBLE	0.10	25	STEEL	(2)	18x10	KRUEGER	880H	-	(1)
R-3	ADJUSTABLE	DOUBLE	0.10	25	STEEL	(2)	20x12	KRUEGER	880H	-	(1)
R-4	ADJUSTABLE	DOUBLE	0.10	25	STEEL	(2)	12x8	KRUEGER	880H	-	(1)
R-5	ADJUSTABLE	DOUBLE	0.10	25	STEEL	(2)	14x10	KRUEGER	880H	-	(1)
R-6	ADJUSTABLE	DOUBLE	0.10	25	STEEL	(2)	8x6	KRUEGER	880H	-	(1)
R-7	ADJUSTABLE	DOUBLE	0.10	25	STEEL	(2)	12x8	KRUEGER	880H	-	(1)
G-1	ADJUSTABLE	DOUBLE	0.10	25	STEEL	(2)	12x8	KRUEGER	880H	-	(1)(7)
G-2	ADJUSTABLE	DOUBLE	0.10	25	STEEL	(2)	18x10	KRUEGER	880H	-	(1)
G-3	ADJUSTABLE	DOUBLE	0.10	25	STEEL	(2)	20x12	KRUEGER	880H	-	(1)
G-4	PERFORATED FILTER GRILLE	DOUBLE	0.10	25	STEEL	(2)	24x24	KRUEGER	SOPP	(3)(4)	(1)
G-5	ADJUSTABLE	DOUBLE	0.10	25	STEEL	(2)	8x12	KRUEGER	880H	-	(1)
G-6	LINEAR FLOOR BAR GRILLE	-	0.10	25	ALUMINUM	(2)	180"	KRUEGER	9540D	-	(1)(2)
G-7	PERFORATED	-	0.10	25	ALUMINUM	(2)	24x24	KRUEGER	9540D	-	(1)
G-8	LATTICE FACE	DOUBLE	0.10	25	ALUMINUM	(2)	6x6	KRUEGER	1130L	-	(1)
G-9	PAVED	SHAKE	0.10	25	STEEL	(2)	48x48	KRUEGER	880H	-	(1)
G-10	ADJUSTABLE	DOUBLE	0.10	25	STEEL	(2)	12x8	KRUEGER	880H	-	(1)
G-11	LATTICE FACE	-	-	-	STEEL	(2)	12x12	KRUEGER	1300L	-	(1)

- REMARKS:
1. CONTRACTOR SHALL VERIFY CEILING AND WALL CONSTRUCTION PRIOR TO FURNISHING MATERIAL.
 2. PROVIDE CUSTOM COLOR MATCHED FINISH. COLOR SAMPLES SHALL BE PROVIDED UPON REQUEST.
 3. PROVIDE FILTER GRILLE FRAME FOR 2" THICK MERV 11 FILTERS.
 4. PROVIDE WITH 14" TUBING FASTENERS.
 5. PROVIDE WITH MEDIUM BRONZE ANODIZED FINISH.
 6. PROVIDE WITH FRAME STYLE H, NO MOUNTING, PENCIL PROOF 7/16" BAR SPACING, AND 7/32" BLADE THICKNESS.
 7. PROVIDE WITH REMOTE VOLUME DAMPER (SEE DETAIL 15M6.3 P.1).
 8. PROVIDE WITH FRAME STYLE E, 3 SLOTS AND FLENUM BOOT WITH 1/2"X3/4" NOCK.
 9. PROVIDE WITH FRAME STYLE E AND 3 SLOTS.

MARK	SERVES	LOCATION	TYPE	FLOW (GPM)	TOTAL HEAD (FT)	SHUT-OFF HEAD (FT)	EFFICIENCY AT OPERATING POINT	FLUID	MAX BHP (7.5)	SUCTION SIZE (IN)	DISCHARGE SIZE (IN)	MAX IMPELLER DIAMETER (IN)	RPM	MANUFACTURER	MODEL	REMARKS
GWP-1	CHWSR	MECHANICAL RM 39	(5)	680	120	215	69	(2)	28.7	6	6	-	3528	GRANDFOS	MPCE 3ACRPH 64-2	(1) (4)
HPWP-1	HPWSR	MECHANICAL RM 21	(8)	3100	170	485	70	(2)	28.3	12	12	-	3340	GRANDFOS	MPCE 3ACRPH 64-3	(1) (4)
HPWP-2	HPWSR	MECHANICAL RM 21	END SUCTION	300 440 (8)	84 50 (8)	99	78 (6) (8)	(2)	8.9 10.0 (8)	3	3	9.50	1750	TACO	TD206C	(1)
HPWP-3	HPWSR	MECHANICAL RM 21	END SUCTION	300 440 (8)	84 50 (8)	99	78 (6) (8)	(2)	8.9 10.0 (8)	3	3	9.50	1750	TACO	TD206C	(1)
HPWP-1	HPWSR	MECHANICAL RM 25	(5)	420	50	125	72	(2)	14.8	6	6	-	2781	GRANDFOS	MPCE 3ACRPH 45-1	(1) (4)
GWP-1	CHWSR	MECHANICAL RM 25	(5)	720	140	215	77	(2)	33.6	6	6	-	3360	GRANDFOS	MPCE 3ACRPH 64-2	(1) (4)
GWP-2	GWSR	MECHANICAL RM 25	END SUCTION	300	30	37	-	(2)	3.2	3	2.5	7.50	1750	TACO	F3007	(1)
GWP-3	GWSR	MECHANICAL RM 25	END SUCTION	300	30	37	75	(3)	3.2	3	2.5	7.50	1750	TACO	F3007	(1)

- REMARKS:
1. SEE MECHANICAL/ELECTRICAL COORDINATION SCHEDULE ON SHEET E6.1 P1 FOR ELECTRICAL DATA.
 2. TREATED WATER.
 3. TREATED WATER WITH 40% PROPYLENE GLYCOL.
 4. PACKAGED PUMP SYSTEM SHALL INCLUDE ONE FACTORY INSTALLED VFC FOR EACH PUMP IN THE SYSTEM.
 5. PACKAGED PUMP SYSTEM CONSISTS OF THREE VERTICAL MULTISTAGE PUMPS WITH ONE OF THE PUMPS BEING REDUNDANT. PUMP PERFORMANCE IS BASED ON ONE OF THE SIX PUMPS OPERATING SIMULTANEOUSLY.
 6. PACKAGED PUMP SYSTEM CONSISTS OF SIX VERTICAL MULTISTAGE PUMPS CAPABLE OF OPERATING SIMULTANEOUSLY. PUMP PERFORMANCE DATA IS BASED ON ONE OF THE SIX PUMPS OPERATING SIMULTANEOUSLY.
 7. ON PUMP PACKAGES WHERE MULTIPLE PUMPS ARE PROVIDED WITH PACKAGE, THE MAXIMUM BHP SHOWN IS FOR ALL SIMULTANEOUSLY OPERATING PUMPS PROVIDED WITH THE PACKAGE AS NOTED IN THESE REMARKS.
 8. OPERATING POINT AT DESIGN FLOW OF ONE PUMP OPERATING IN PARALLEL WITH A SECOND IDENTICAL PUMP ONE PUMP OPERATING BY ITSELF WITH MAX FLOW GOING TO BOTH HEAT EXCHANGERS OR IN/OUT WITHOUT OVERLOADING THE PUMP MOTOR.

HOT WATER FINNED TUBE SCHEDULE (PHASE 1)																
MARK	SERVES	LOCATION	CONFIGURATION	HEIGHT (IN)	COVER WIDTH (IN)	MATERIAL	NO. OF ROWS	ELEMENT MATERIAL	TUBE DIAMETER (IN)	FIN SIZE (INxW)	FINSP/FT	FLUID TYPE	EWT (°F)	LWT (°F)	AWT (°F)	REMARKS
FT-1	LOW HEIGHT WALLS	3RD FLOOR	FLAT TOP - FRONT OUTLET	14	5.3	STEEL	2	ALUMINUM	0.75	3.56x.25	50	(1)	127	97	112	SEE PLANS
FT-2	MED HEIGHT WALLS	3RD FLOOR	FLAT TOP - FRONT OUTLET	24	5.3	STEEL	2	ALUMINUM	0.75	3.56x.25	50	(1)	127	97	112	SEE PLANS

- REMARKS:
1. TREATED WATER WITH 40% PROPYLENE GLYCOL.
 2. ACTIVE LENGTH OF FINNED TUBE SHALL BE DETERMINED FROM FIN TUBE CAPACITY SHOWN ON PLANS DIVIDED BY THE BTU/H FOR LINEAL FOOT SHOWN ON THIS SCHEDULE.
 3. FINNED TUBE COVER LENGTHS SHALL INCLUDE SPACE BETWEEN ACTIVE FINNED TUBE SECTIONS. PROVIDE NECESSARY ADDITIONAL COVER SECTIONS PROVIDING A CONTINUOUS FINNED TUBE COVER CONDITION WHICH WRAPS AROUND CORNERS, EXPOSED COLUMNS, ETC.

MARK	SERVES	LOCATION	CONFIGURATION	HEATING CAPACITY (MBH)	AIRFLOW (CFM)	FLUID TYPE	EWT (°F)	LWT (°F)	GPM	MAX WPD (FT)	DIMENSIONS (LxWxH) (IN)	SHIPPING WEIGHT (LBS)	MANUFACTURER	MODEL	REMARKS
UH-12	SW DOCK 12	SW DOCK 12	VERTICAL	45.7	2,500	(2)	127	97	3.0	0.1	25x24x14	118	ZENDEER RITTLING	R9-161	(1)(2)(3)
UH-18	SE DOCK 18S	SE DOCK 18S	VERTICAL	45.7	2,500	(2)	127	97	3.0	0.1	25x24x14	118	ZENDEER RITTLING	R9-161	(1)(2)(3)
UH-35	MED-35	MED-35	VERTICAL	15.7	1,150	(2)	127	97	1.1	0.1	25x24x10	65	ZENDEER RITTLING	R9-59	(1)(2)(3)
UH-3	STORAGE 35	STORAGE 35	VERTICAL	15.7	1,150	(2)	127	97	1.1	0.1	25x24x10	65	ZENDEER RITTLING	R9-59	(1)(2)(3)
UH-A2225W-N1	2ND FLOOR ATTIC SW	2ND FLOOR ATTIC SW	HORIZONTAL	28.7	1,550	(2)	127	97	1.9	0.1	16x26x27	88	ZENDEER RITTLING	R9-108	(1)(2)(3)
UH-A2225W-W2	2ND FLOOR ATTIC SW	2ND FLOOR ATTIC SW	HORIZONTAL	28.7	1,550	(2)	127	97	1.9	0.1	16x26x27	88	ZENDEER RITTLING	R9-108	(1)(2)(3)
UH-A2225W-S1	2ND FLOOR ATTIC SW	2ND FLOOR ATTIC SW	HORIZONTAL	28.7	1,550	(2)	127	97	1.9	0.1	16x26x27	88	ZENDEER RITTLING	R9-108	(1)(2)(3)
UH-A2225W-S2	2ND FLOOR ATTIC SW	2ND FLOOR ATTIC SW	HORIZONTAL	28.7	1,550	(2)	127	97	1.9	0.1	16x26x27	88	ZENDEER RITTLING	R9-108	(1)(2)(3)
UH-A2225W-S3	2ND FLOOR ATTIC SW	2ND FLOOR ATTIC SW	HORIZONTAL	28.7	1,550	(2)	127	97	1.9	0.1	16x26x27	88	ZENDEER RITTLING	R9-108	(1)(2)(3)
UH-S-V-B	VESTIBULE S-V-B	VESTIBULE S-V-B	VERTICAL	68.9	5,130	(2)	127	97	4.7	0.1	35x35x17	185	ZENDEER RITTLING	R9-247	(1)(2)(3)

- REMARKS:
1. SEE MECHANICAL/ELECTRICAL COORDINATION SCHEDULE ON SHEET E6.1 P1 FOR ELECTRICAL DATA.
 2. TREATED WATER WITH 40% PROPYLENE GLYCOL.
 3. PROVIDE WITH FACTORY MOUNTED FAN SPEED CONTROLLER.
 4. PROVIDE WITH AQUASTAT FOR FIELD INSTALLATION.

SHELL AND TUBE HEAT EXCHANGER SCHEDULE (STEAM TO WATER) (PHASE 1)

MARK	SERVES	LOCATION	CONFIGURATION	STEAM PRESSURE (LBS)	TUBE SIDE DATA FLOW (LBS/HR)	TRAP CAPACITY (LBS/HR)	FLUID	GPM	FOULING FACTOR	SHELL SIDE DATA EWT (°F)	LWT (°F)	WPD (FT)	DIMENSIONS (LxWxH) (IN)	OPERATING WEIGHT (LBS)	MANUFACTURER	MODEL	REMARKS
H-6.1	GWSR	MECHANICAL RM 6	SINGLE - HORIZONTAL	50	(2)	(2)	WATER	300	0.001	50	80	3.5	103x26x9	-	THERMAFLO	TH002XX-105 VACUFLU PACKAGE	(1)
H-6.2	HPWSR	MECHANICAL RM 6	DUAL - HORIZONTAL	50	(2)	(2)	WATER	300 EACH	0.005	50	80	3.5	103x26x9	-	THERMAFLO	TH002XX-105 VACUFLU PACKAGE	(4)

- REMARKS:
1. HEAT EXCHANGER PACKAGE INCLUDES ONE HORIZONTAL CONFIGURED SHELL & TUBE HEAT EXCHANGER ON A SINGLE SKID, PRE-PIPED WITH VALVES AND GAUGES AND A STEAM CONTROL VALVE WITH 1001 FLOW TURNDOWN, A FACTORY CONDENSATE RECEIVER, A FACTORY MOUNTED STEAM POWERED VACUUM RATED CONDENSATE RETURN PUMP, INTEGRAL CONTROL PANEL WITH CONTROLLER AND INDICATOR & SAFETY LIGHTS, AND SUPPORT STAND. PROVIDE WITH PIPING, INLET AND OUTLET WATER CONNECTIONS, 3" PLANGED STEAM VALVE CONNECTION, 2" PLANGED CONDENSATE OUTLET CONNECTION, AND FACTORY INSULATION KIT.
 2. THERE ARE NO TRAPS REQUIRED FOR EITHER PACKAGE AS THE PACKAGE COMES PRE-PIPED. CONTRACTOR TO CONNECT CONDENSATE PIPING TO OUTLET OF STEAM POWERED VACUUM PUMP.
 3. THE STEAM FLOW TO EACH OF THE TWO HEAT EXCHANGERS PROVIDED WITH THE HX PACKAGE = 4601 LBS/HR.
 4. HEAT EXCHANGER PACKAGE INCLUDES TWO HORIZONTAL CONFIGURED SHELL & TUBE HEAT EXCHANGERS IN A SINGLE SKID, WITH EACH HEAT EXCHANGER PRE-PIPED WITH VALVES AND GAUGES, WITH TWO STEAM CONTROL VALVES WITH 1001 FLOW TURNDOWN, TWO FACTORY CONDENSATE RECEIVERS, TWO FACTORY MOUNTED STEAM POWERED VACUUM RATED CONDENSATE RETURN PUMPS, INTEGRAL CONTROL PANELS WITH CONTROLLER AND INDICATOR & SAFETY LIGHTS, AND A BELLEVUE SUPPORT STAND. PROVIDE WITH HEAT EXCHANGER FOR THIS PACKAGE WITH 4" PLANGED INLET AND OUTLET WATER CONNECTIONS, 3" PLANGED STEAM VALVE CONNECTIONS, 2" PLANGED CONDENSATE OUTLET CONNECTIONS, AND FACTORY INSULATION KIT.
 5. TREATED WATER WITH 40% PROPYLENE GLYCOL.
 6. SEE MECHANICAL/ELECTRICAL COORDINATION SCHEDULE ON SHEET E6.1 P1 FOR ELECTRICAL DATA.

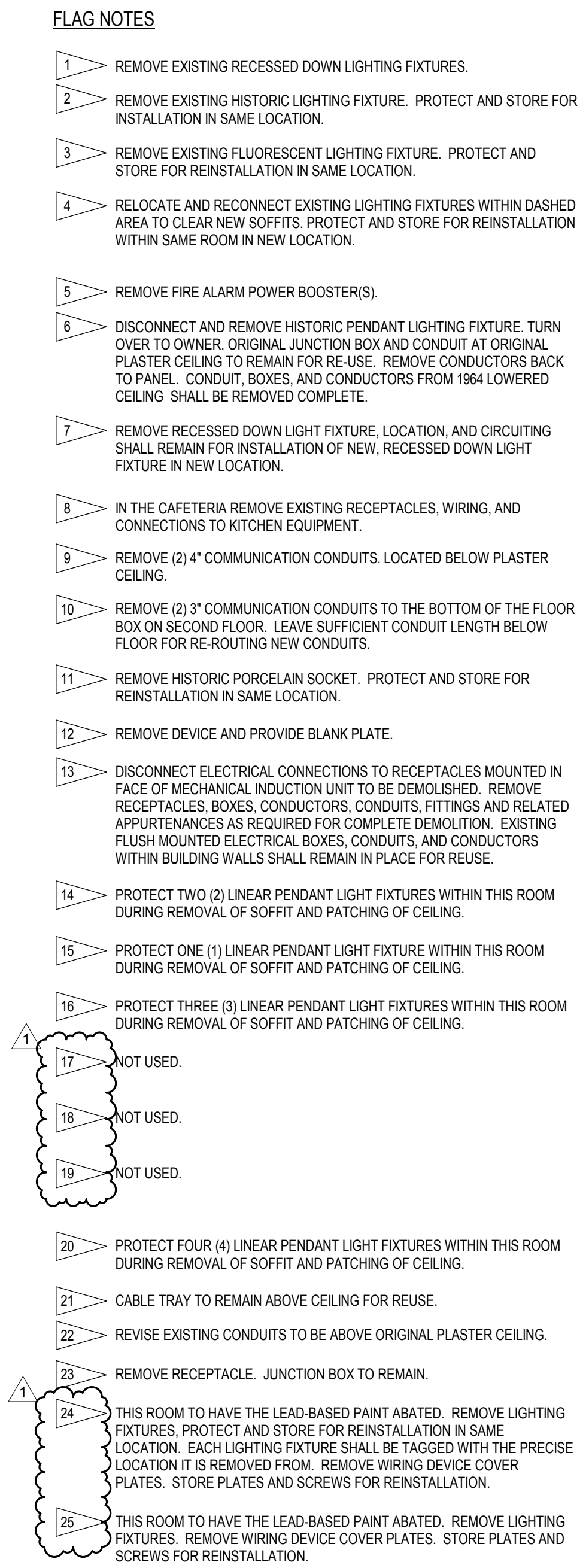
MODULAR WATER COOLED HEAT RECOVERY CHILLER SCHEDULE (PHASE 1)

MARK	SERVES	LOCATION	COOLING CAPACITY (TONS)	HEATING CAPACITY (MBH)	COMPRESSOR TYPE	NO. OF COMPRESSORS	STEPS UNLOADING	REFRIGERANT	SOUND POWER (dBA)	COOLING PERFORMANCE DATA								HEATING PERFORMANCE DATA								SIMULTANEOUS PERFORMANCE DATA								DIMENSIONS (LxWxH) (IN)	OPERATING WEIGHT (LBS)	MANUFACTURER	MODEL	REMARKS
										FLUID TYPE (6)	EWT (°F) (6)	LWT (°F) (6)	WPD (FT) (6)	GPM (6)	FOULING FACTOR (6)	KW/TON	EER COP	FLUID TYPE (7)	EWT (°F) (7)	LWT (°F) (7)	WPD (FT) (7)	GPM (7)	FOULING FACTOR (7)	KW/TON	EER COP	EWT (°F) (8)	LWT (°F) (8)	GPM (8)	KW/TON	EER COP								
HRC-1	HWSR & CHWSR	MED-19	508	6,275	SCROLL	12	12	R-410A	(2)	(5) (6)	99 (6)	44 (6)	10.9 16.4	815 1478	0.001/0.001	0.73	16.40 4.81	(5) (6)	100 (6)	130 (6)	6.0 16.4	418 907	0.001/0.001	1.35	3.80 3.61	59 106	44 130	443 300	1.24	9.67 6.70	286x34x19	23,960	MULTISTACK	(8)	(1)(2)(3)(4)			

- REMARKS:
1. SEE MECHANICAL/ELECTRICAL COORDINATION SCHEDULE ON SHEET E6.1 P1 FOR ELECTRICAL DATA.
 2. PROVIDE WITH ACCELERATED COMPRESSOR WARM AND WITH REDUCED ACCELERATION PANELS. SEE THE EQUIPMENT SOUND PRESSURE SCHEDULE FOR MAXIMUM SOUND PRESSURE LEVELS.
 3. PROVIDE WITH SIX VALUING MULTISTACK MODEL WMEH24S SECTIONS OR SIMILAR. SEE DETAIL 15M.3 P.1.
 4. THE WORKING PRESSURE FOR THE CHWSR SYSTEM, HWSR SYSTEM, AND HPWSR SYSTEM AT HRC-1 SHALL BE THE SAME. FIELD VERIFY EXACT PRESSURES.
 5. TREATED WATER.
 6. CHILLED WATER (CHWSR) SINK WATER (HPWSR).
 7. HEATING HOT WATER (HWSR) SOURCE WATER (HPWSR).
 8. CHILLED WATER (CHWSR) HEATING HOT WATER (HWSR).
 9. BASED ON SIX MODULES, EACH WITH A MODEL NUMBER OF M0083XCH2024C.

STEAM RADIATOR RENOVATION SCHEDULE (PHASE 1)

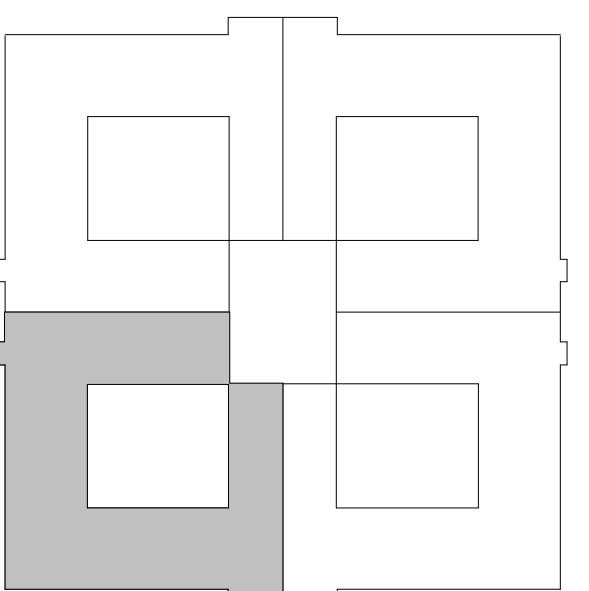
MARK	SERVES	LOCATION	REUSE OR ABANDON	SQUARE FOOT E.D.R.	TOTAL HEATING CAPACITY (MBH)	CONFIGURATION	CONCEALED OR EXPOSED?	WIDTH (IN)	LENGTH (IN)	HEIGHT (IN)	NO. OF VERTICAL RADIATOR COLUMNS	NO. OF RADIATOR SECTIONS	STEAM CONNECTION SIZE (IN)	CONDENSATE CONNECTION SIZE (IN)	EXISTING TYPE
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REVISIONS SCHEDULE		
MARK	DATE	DESCRIPTION
1	5/16/2018	ADDENDUM #5

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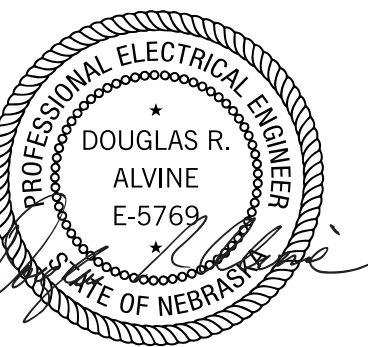
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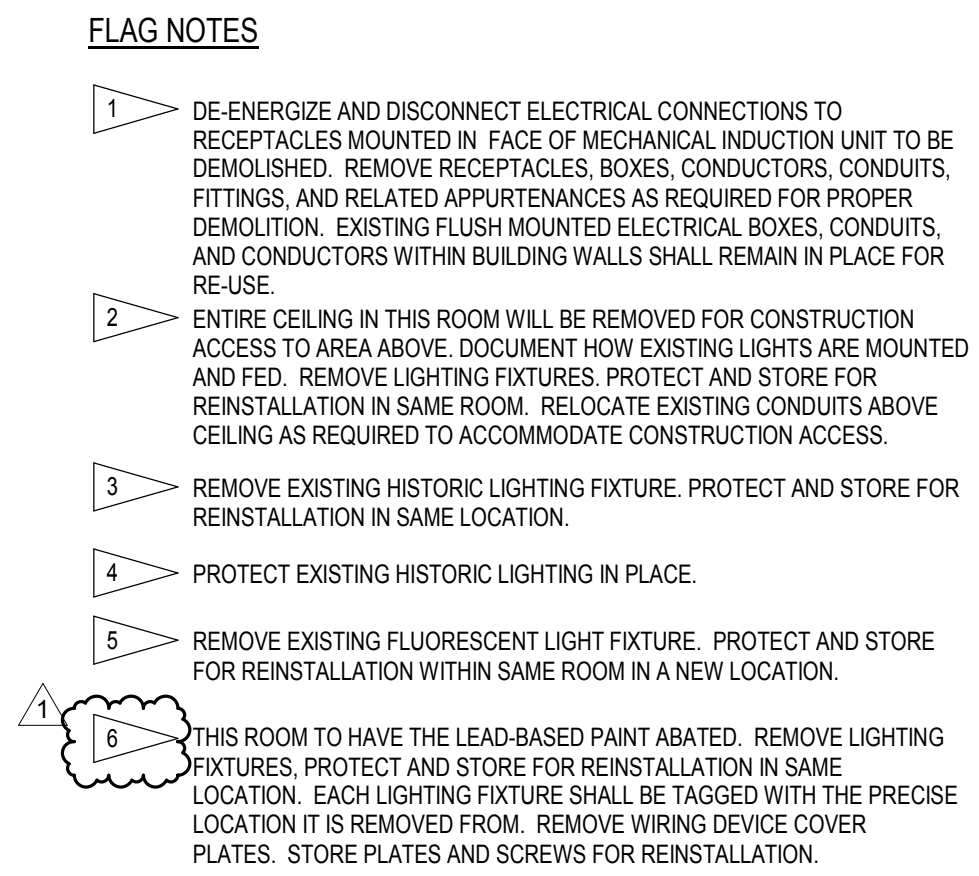
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DATE: APRIL 23 2018
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FIRST FLOOR DEMO PLAN - SW -
ELECTRICAL

ED1.1
P1

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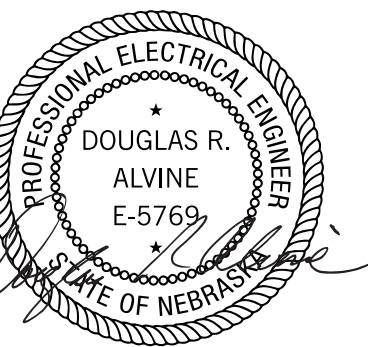


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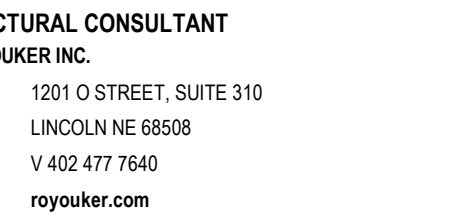
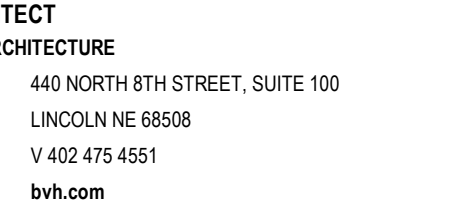
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**SECOND FLOOR DEMO PLAN -
SW - ELECTRICAL**

ED1.2
P1

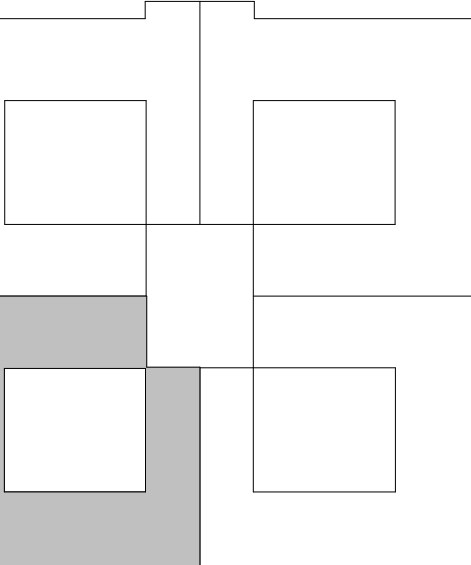
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REVISIONS SCHEDULE		
NRK	DATE	DESCRIPTION
	5/16/2018	ADDENDUM #5

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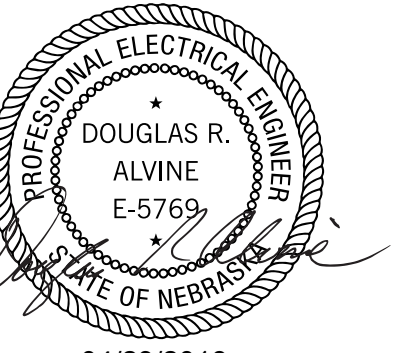
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**2ND FLOOR DEMO PLAN - SW -
ELECTRICAL**

ED1.3
B4

ED1.3
P1

FLAG NOTES

1. DISCONNECT POWER TO MECHANICAL EQUIPMENT TO ALLOW FOR REMOVAL.
 2. DISCONNECT POWER TO BMCS PANEL. COORDINATE WITH MECHANICAL CONTRACTOR.
 3. REMOVE PANEL AND ASSOCIATED FEEDER AND BRANCH CIRCUITS.
 4. TRANSFER (3) 20AMP BRANCH CIRCUITS FROM REMOVED PANEL 3EM TO EXISTING PANEL 3LW.
 5. REMOVE COMBINATION STARTERS AND FEEDERS.
 6. REMOVE STARTERS, WIREWAY AND ASSOCIATED APPURTENANCES.
 7. REMOVE JUNCTION BOXES AND ASSOCIATED FEEDERS.
8. THIS ROOM TO HAVE THE LEAD-BASED PAINT ABATED. REMOVE LIGHTING FIXTURES. REMOVE WIRING DEVICE COVER PLATES. STORE PLATES AND SCREWS FOR REINSTALLATION.

8 THIS ROOM TO HAVE THE LEAD-BASED PAINT ABATED. REMOVE LIGHTING FIXTURES, REMOVE WIRING DEVICE COVER PLATES. STORE PLATES AND SCREWS FOR REINSTALLATION.

NOTE:
ALL FIRE ALARM DEVICES INDICATED
ON THIS SHEET ARE CONNECTED TO EXISTING
FIRE ALARM CONTROL PANEL "B"

1 P1 THIRD FLOOR - DEMO - SW - ELECTRICAL

$1/8" = 1'-0"$

A horizontal graphic scale bar with alternating black and white segments. Below the bar, numerical labels indicate distances in feet: 4', 8', 16', 24', 32', and 40'.

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2 P1 ALTERNATE 1 - DEMO - HEARING ROOMS - ELECTRICAL

1/8" = 1'-0"
4' 8' 16' 24' 32' 40'

1 P1 BASE BID - DEMO - HEARING ROOMS - ELECTRICAL

1/8" = 1'-0"
4' 8' 16' 24' 32' 40'

3 P1 MEZZANINE 1 - DEMO - TOWER - ELECTRICAL

1/8" = 1'-0"
4' 8' 16' 24' 32' 40'

- FLAG NOTES
- 1 REMOVE LIGHTING IN THIS ROOM COMPLETE. REMOVE CONDUIT AND CONDUCTORS BACK TO PANEL.
 - 2 REMOVE DOWN LIGHT AND PROTECT AND STORE FOR REINSTALLATION IN SAME LOCATION.
 - 3 NOT USED.
 - 4 NOT USED.
 - 5 THIS ROOM TO HAVE THE LEAD-BASED PAINT ABATED. REMOVE LIGHTING FIXTURES. PROTECT AND STORE FOR REINSTALLATION IN SAME LOCATION. EACH LIGHTING FIXTURE SHALL BE TAGGED WITH THE PRECISE LOCATION IT IS REMOVED FROM. REMOVE WIRING DEVICE COVER PLATES. STORE PLATES AND SCREWS FOR REINSTALLATION.
 - 6 REMOVE DOWN LIGHT TRIM RINGS TO ALLOW FOR LEAD-BASED PAINT ABATEMENT. PROTECT AND STORE FOR REINSTALLATION IN SAME LOCATION.
 - 7 REMOVE TRACK LIGHTING SYSTEM TO ALLOW FOR LEAD-BASED PAINT ABATEMENT. PROTECT AND STORE FOR REINSTALLATION IN SAME LOCATION.
 - 8 THIS ROOM TO HAVE THE LEAD-BASED PAINT ABATED. REMOVE WIRING DEVICE COVER PLATES. STORE PLATES AND SCREWS FOR REINSTALLATION.

REVISIONS SCHEDULE		
MARK	DATE	DESCRIPTION
1	5/16/2018	ADDENDUM #5

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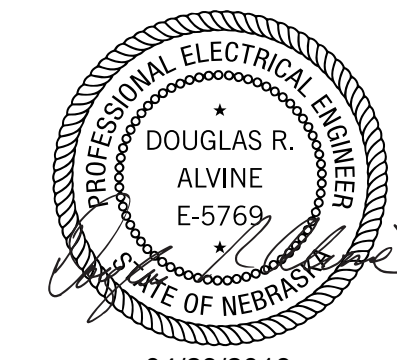
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REPLACEMENT AND WINDOW
RESTORATION

PROJECT: OCC 2014485
BVH L14077
DATE: APRIL 23 2018

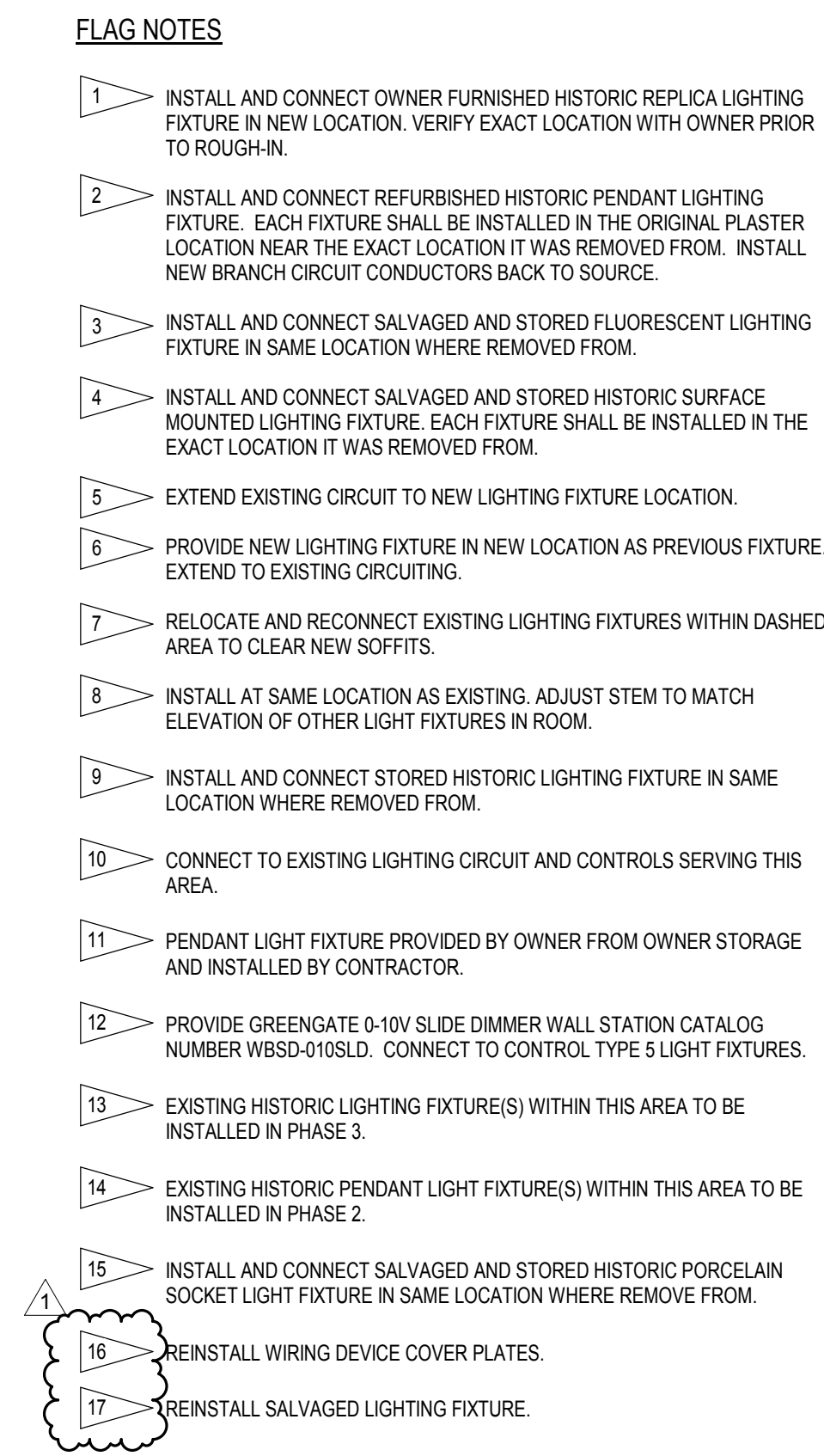


PARTIAL DEMO FLOOR PLANS -
ELECTRICAL

NORTH
1

ED1.4
P1

ALVINE ELECTRICAL CONTACT
GENE NEWMANN
PHONE: (402) 477-8161
EMAIL: GNEWMANN@ALVINE.COM



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**NEBRASKA STATE CAPITOL HVAC
REPLACEMENT AND WINDOW
RESTORATION**

PROJECT: OCC 201405
BVH L14077

**FIRST FLOOR PLAN - SW -
LIGHTING**

E1.1
P1

ALVINE ELECTRICAL CONTACT
GENE NEEMANN
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EMAIL: GNEEMANN@ALVINE.COM

INSTALL GREEN INSULATED GROUND WIRE WITH EACH LIGHTING, RECEPTACLE, AND EQUIPMENT BRANCH CIRCUIT.

PROVIDE A DEDICATED NEUTRAL CONDUCTOR FOR EACH BRANCH CIRCUIT REQUIRING A NEUTRAL UNLESS OTHERWISE NOTED.

1 P1 FIRST FLOOR - SW - LIGHTING

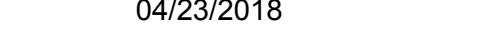
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DATE: 1998.03.20

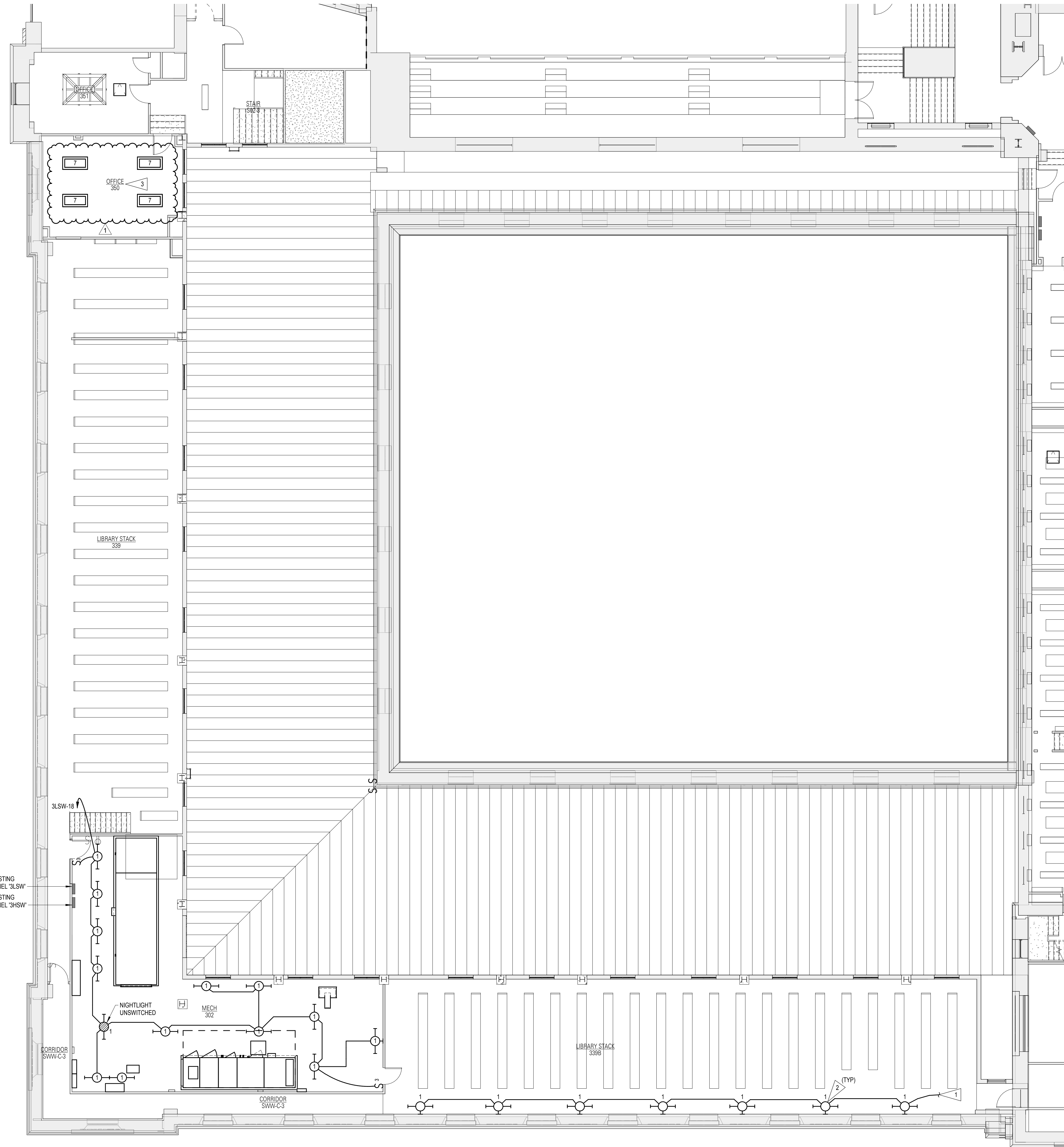


p1

7 REINSTALL SALVAGED LIGHTING FIXTURE.

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- FLAG NOTES
1. CONNECT TO EXISTING LIGHTING CIRCUIT AND CONTROLS SERVING THIS AREA.
 2. WALL MOUNT NEW LIGHTING FIXTURE ON WALL AT SAME ELEVATION AS PREVIOUS LIGHTING FIXTURES WERE.
 3. REINSTALL WIRING DEVICE COVER PLATES.



1 P1 THIRD FLOOR - SW - LIGHTING

1/8\"/>

INSTALL GREEN INSULATED GROUND WIRE WITH EACH LIGHTING RECEPTACLE AND EQUIPMENT BRANCH CIRCUIT.

PROVIDE A DEDICATED NEUTRAL CONDUCTOR FOR EACH BRANCH CIRCUIT REQUIRING A NEUTRAL, UNLESS OTHERWISE NOTED.

ALVINE ELECTRICAL CONTACT
GENE NEWMAN
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R. O. YOUKER, INC.
CONSULTING ENGINEERS

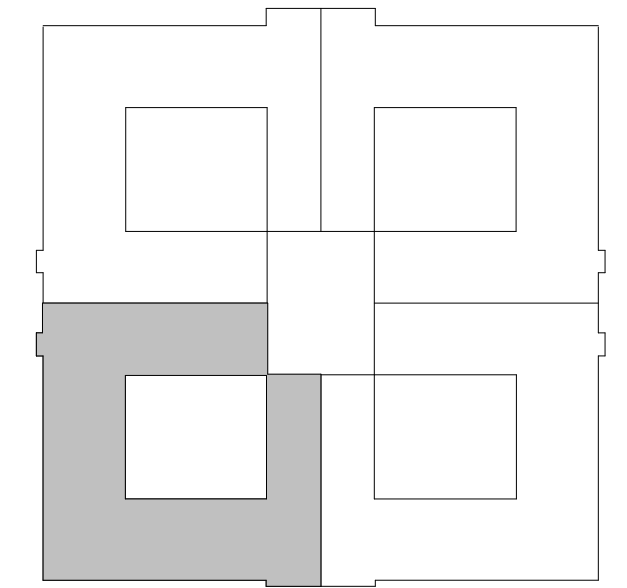
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V 402.477.7640
royouker.com

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benesch.com

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MARK	DATE	DESCRIPTION
1	5/16/2018	ADDENDUM #5

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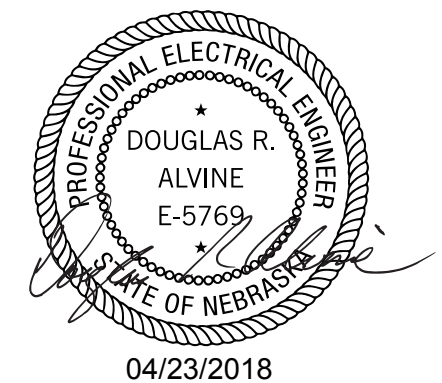
KEYPLAN - SOUTHWEST

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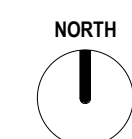
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NEBRASKA STATE CAPITOL HVAC REPLACEMENT AND WINDOW RESTORATION

PROJECT: OCC 201485 BVH L14077 DATE: APRIL 23 2018



THIRD FLOOR PLAN - SW - LIGHTING

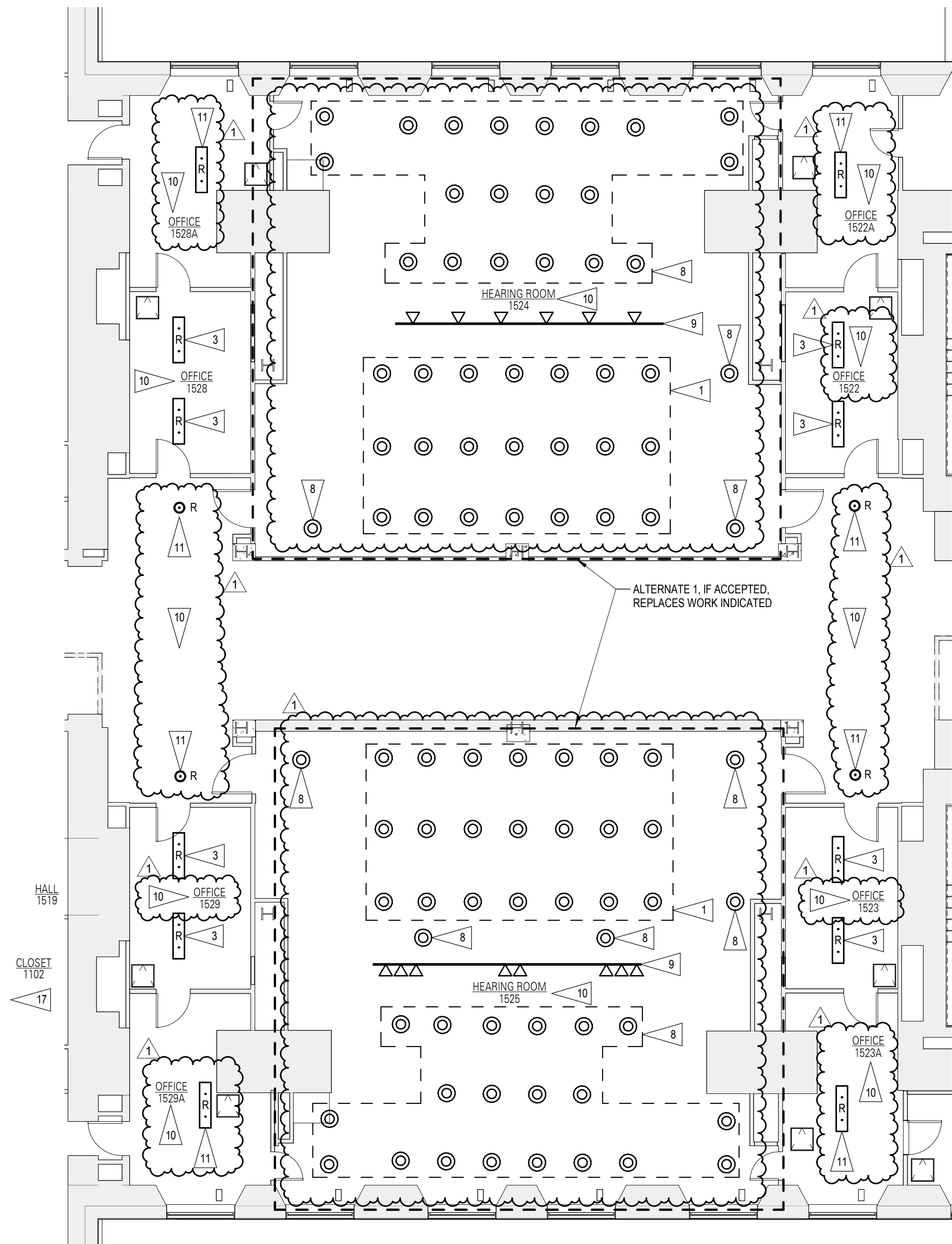


E1.3
P1

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1 P1 BASE BID - HEARING ROOMS - LIGHTING

1/8" = 1'-0" 4' 8' 16' 24' 32' 40'



ALVINE ELECTRICAL CONTACT
GENE NEEMANN
PHONE: (402) 477-8161
EMAIL: GNEEMANN@ALVINE.COM

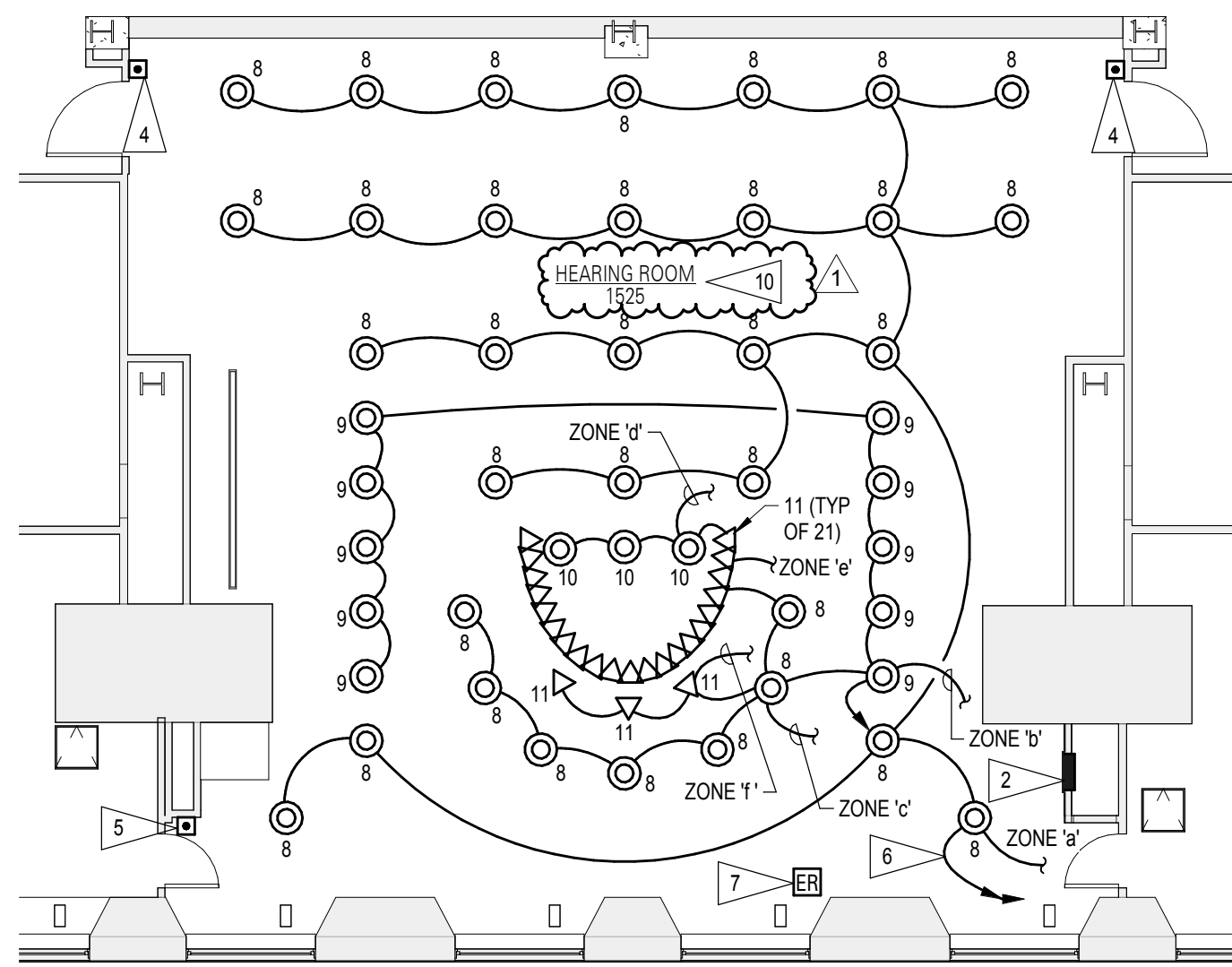
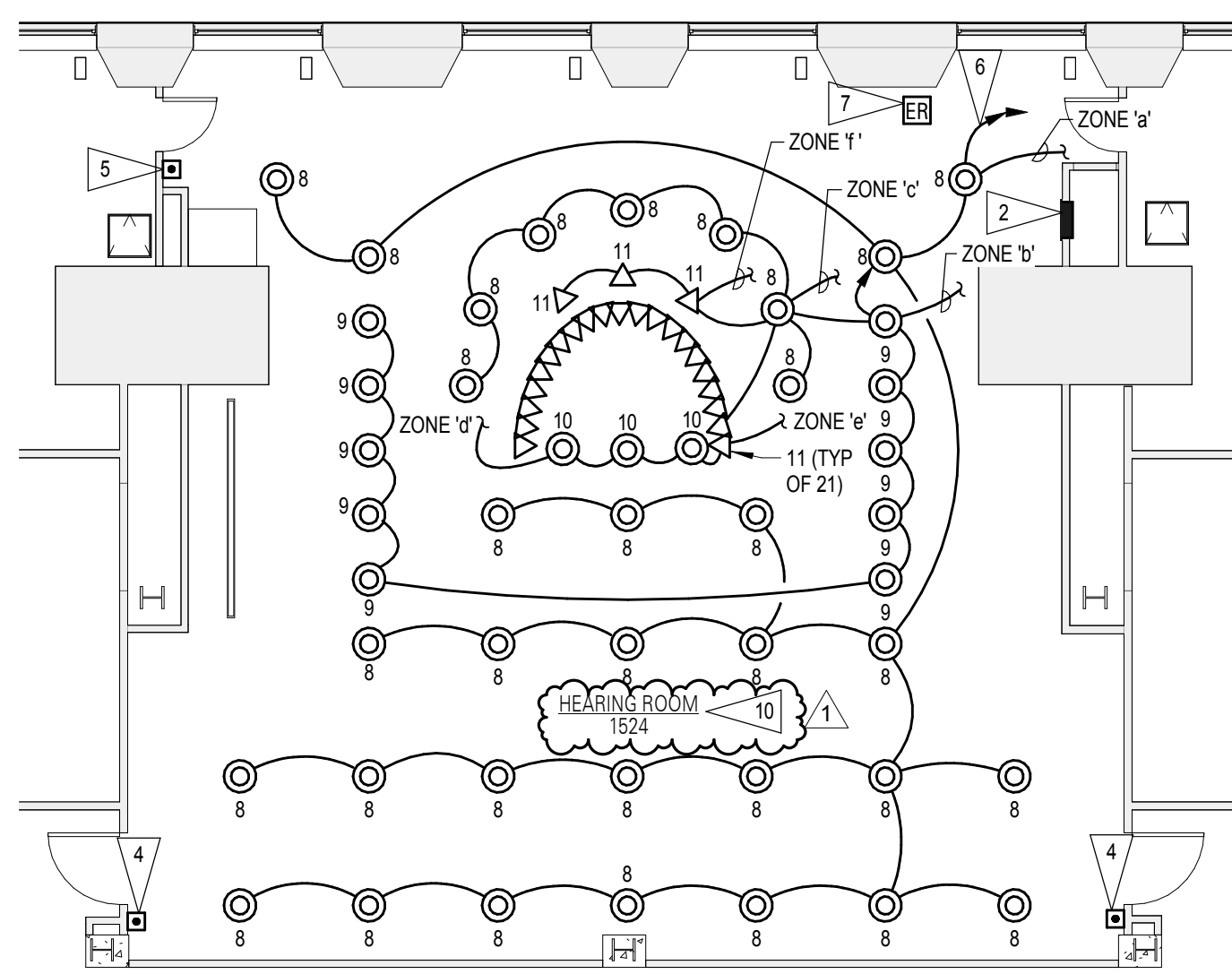
INSTALL GREEN INSULATED
GROUND WIRE WITH EACH
LIGHTING RECEPTACLE, AND
EQUIPMENT BRANCH CIRCUIT.
PROVIDE A DEDICATED NEUTRAL
CONDUCTOR FOR EACH BRANCH
CIRCUIT REQUIRING A NEUTRAL,
UNLESS OTHERWISE NOTED.

FLAG NOTES

- 1 INSTALL AND CONNECT STORED DOWNLIGHT IN SAME LOCATION WHERE REMOVED FROM.
- 2 LUTRON GRAFIK EYE. SEE LIGHTING CONTROL SCHEMATIC 2 ON E5.1 P1.
- 3 INSTALL AND CONNECT SALVAGED AND STORED FLUORESCENT LIGHTING FIXTURE IN SAME LOCATION WHERE REMOVED FROM.
- 4 LUTRON 2-BUTTON WALL STATION. SEE LIGHTING CONTROL SCHEMATIC 2 ON E5.1 P1.
- 5 LUTRON 5-BUTTON WALL STATION. SEE LIGHTING CONTROL SCHEMATIC 2 ON E5.1 P1. CUT AND CHANNEL BOX AND RACEWAY INTO EXISTING WALL.
- 6 CONNECT TO EXISTING LIGHTING CIRCUIT SERVING THIS AREA.
- 7 FOR ZONE 'V' PROVIDE UL24 EMERGENCY BY PASS RELAY TO BY PASS NORMAL 5-15V AND CONTROLS TO TURN ZONE 'V' LIGHTS ON TO FULL BRIGHTNESS.
- 8 REINSTALL DOWN LIGHT TRIM RINGS IN SAME LOCATION WHERE REMOVED FROM.
- 9 REINSTALL TRACK LIGHTING SYSTEM IN SAME LOCATION WHERE REMOVED FROM.
- 10 REINSTALL WIRING DEVICE COVER PLATES.
- 11 REINSTALL SALVAGED LIGHTING FIXTURE.

2 P1 ALTERNATE 1 - HEARING ROOMS - LIGHTING

1/8" = 1'-0" 4' 8' 16' 24' 32' 40'



NORTH
1

E1.4
P1

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RESTORATION

PROJECT: OCC 2014485
BVH L14077

DATE: APRIL 23 2018

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PARTIAL FLOOR PLANS - SW -
LIGHTING

REVISIONS SCHEDULE		
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PARTIAL FLOOR PLANS - SW -
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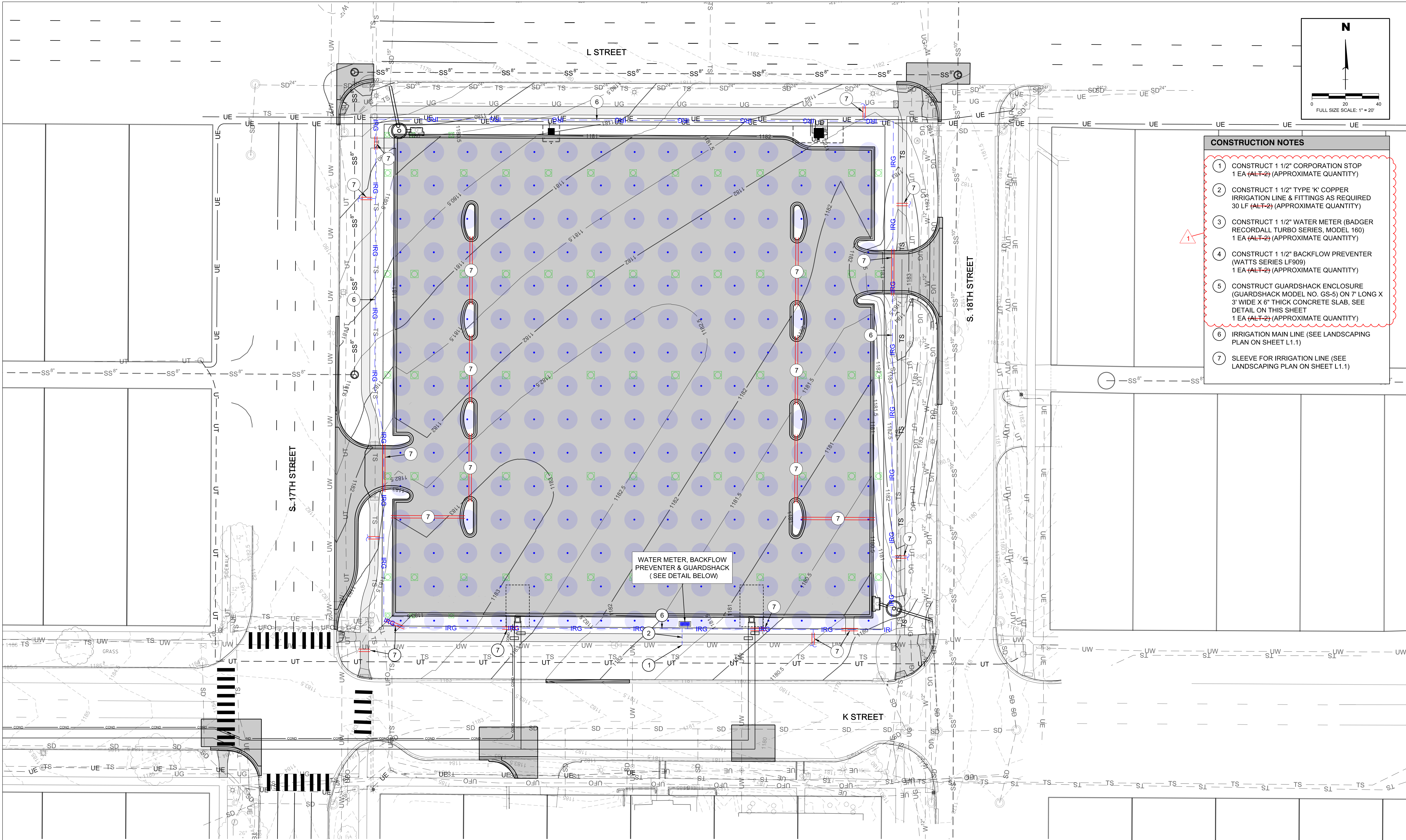


PARTIAL FLOOR PLANS - SW -
LIGHTING

REVISIONS SCHEDULE		
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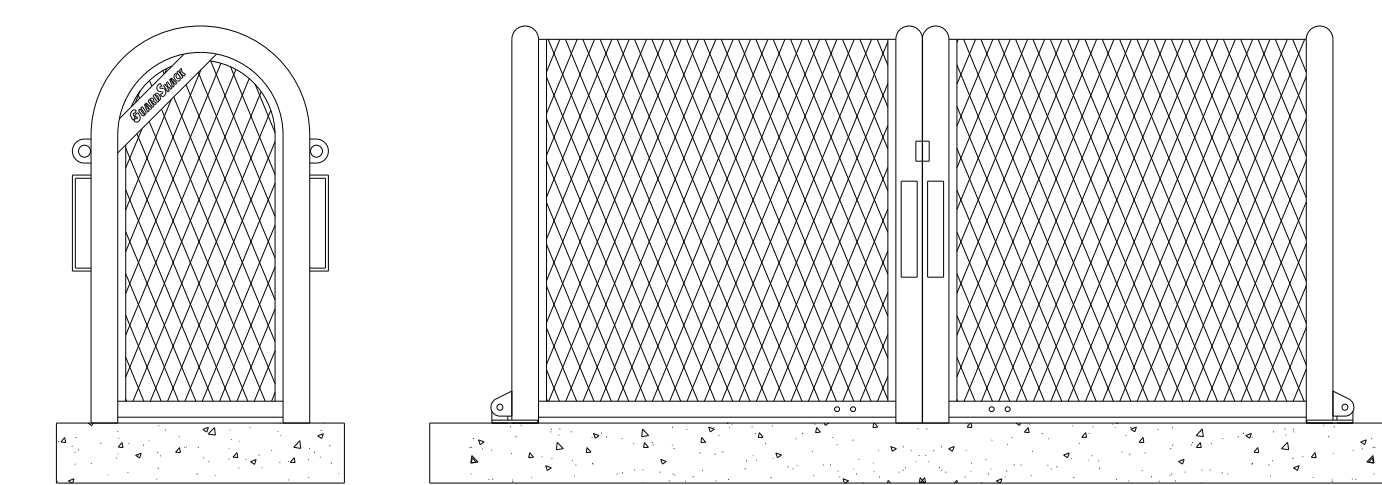
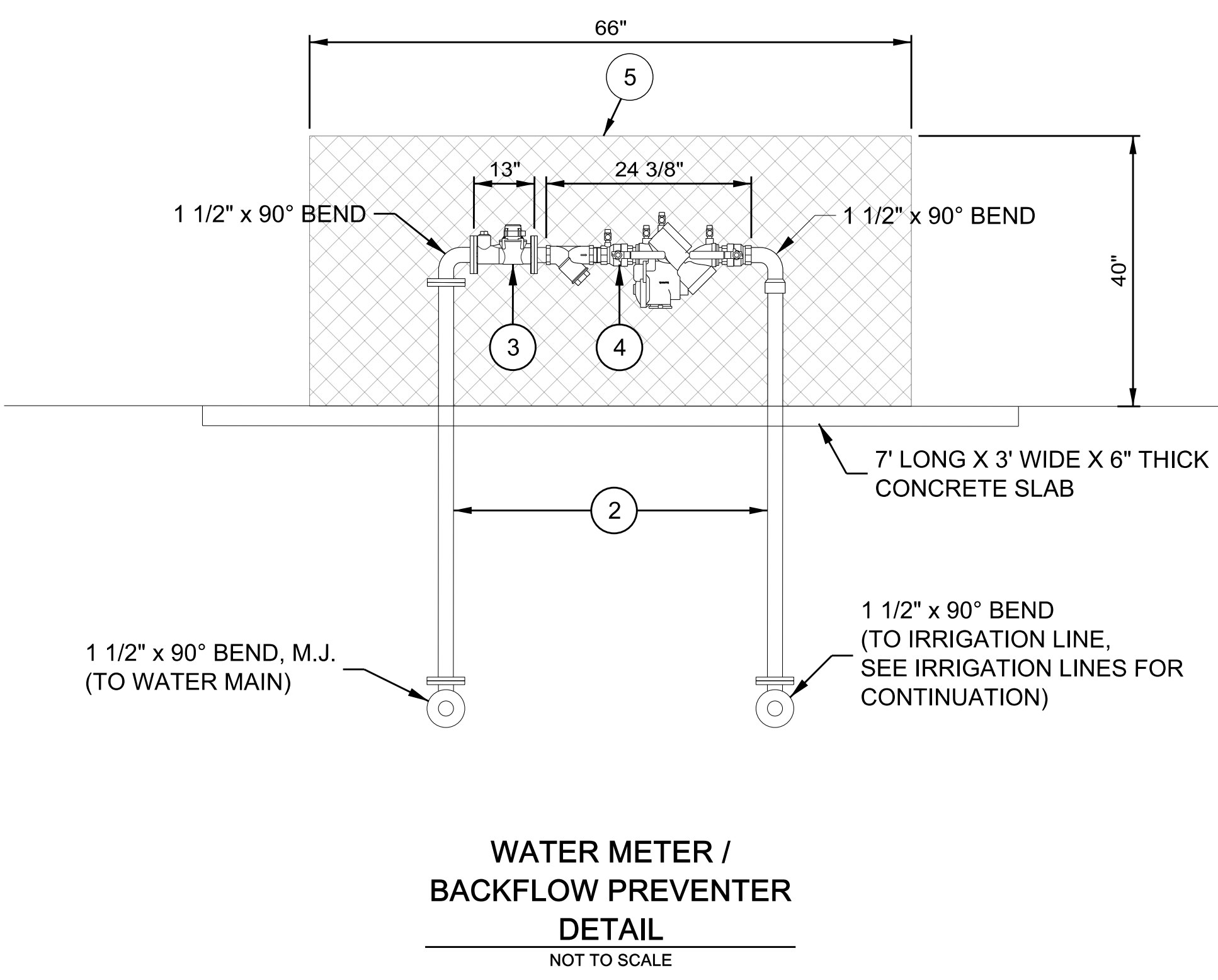
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- ### CONSTRUCTION NOTES
1. CONSTRUCT 1 1/2" CORPORATION STOP
1 EA (ALT-2) (APPROXIMATE QUANTITY)
 2. CONSTRUCT 1 1/2" TYPE 'K' COPPER
IRRIGATION LINE & FITTINGS AS REQUIRED
30 LF (ALT-2) (APPROXIMATE QUANTITY)
 3. CONSTRUCT 1 1/2" WATER METER (BADGER
RECORDALL TURBO SERIES, MODEL 160)
1 EA (ALT-2) (APPROXIMATE QUANTITY)
 4. CONSTRUCT 1 1/2" BACKFLOW PREVENTER
(WATTS SERIES LF909)
1 EA (ALT-2) (APPROXIMATE QUANTITY)
 5. CONSTRUCT GUARDSHACK ENCLOSURE
(GUARDSHACK MODEL NO. GS-5) ON 7" LONG X
3" WIDE X 6" THICK CONCRETE SLAB, SEE
DETAIL ON THIS SHEET
1 EA (ALT-2) (APPROXIMATE QUANTITY)
 6. IRRIGATION MAIN LINE (SEE LANDSCAPING
PLAN ON SHEET L1.1)
 7. SLEEVE FOR IRRIGATION LINE (SEE
LANDSCAPING PLAN ON SHEET L1.1)

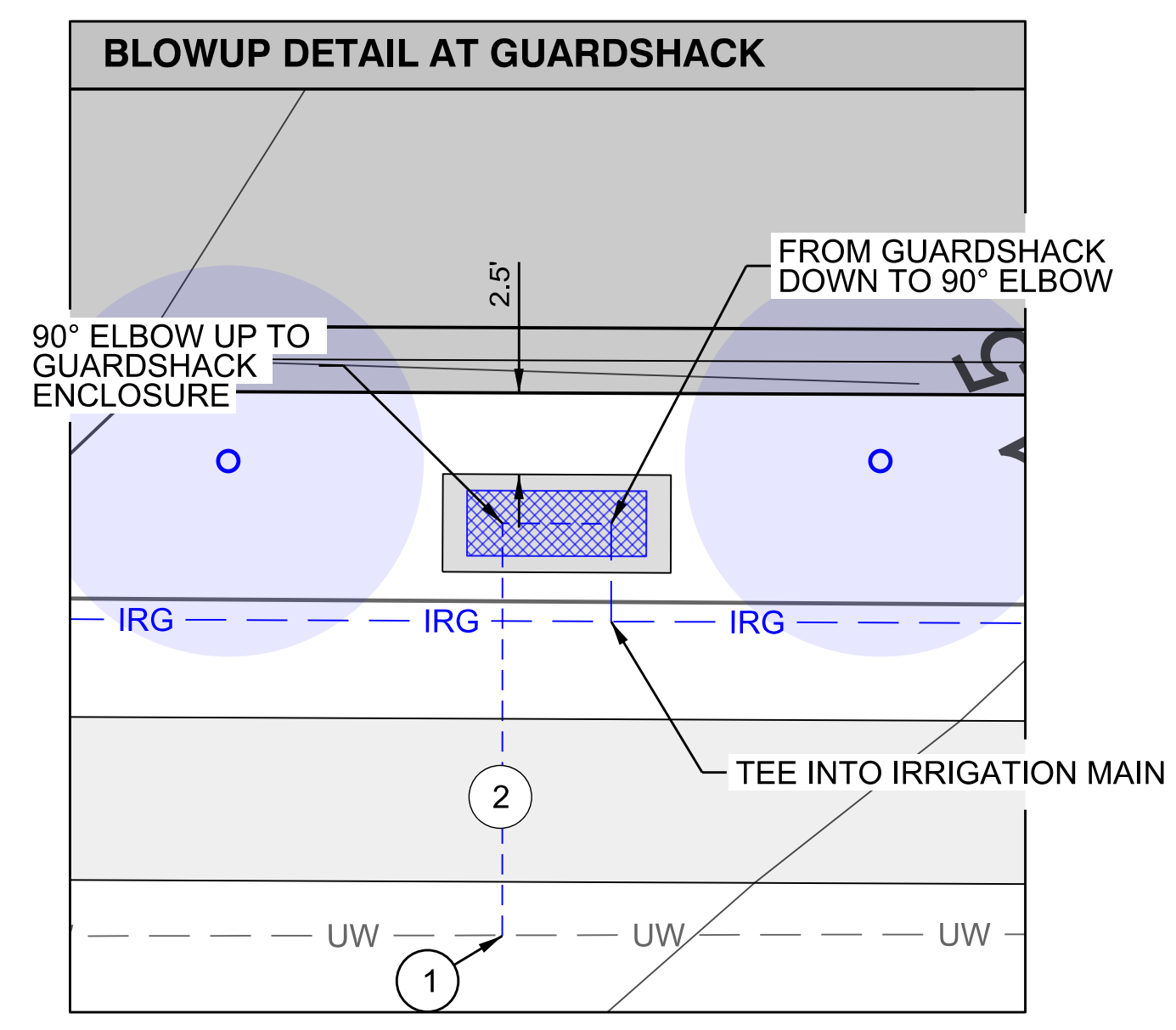
WATER METER, BACKFLOW
PREVENTER & GUARDSHACK
(SEE DETAIL BELOW)



- ### GUARDSHACK™ GENERAL SPECIFICATIONS
- All pipe shall be 1 1/2" schedule 40 A.S.T.M. A-53 Grade A-Electric Weld pipe.
 - Angle iron shall be 1" x 1" x 1/2" steel.
 - Stainless steel units shall be 1 1/2" schedule 10 A.S.T.M. A-312 304 S.S.
 - Expanded metal shall be 1/2" spacing x # 13 Ga. flattened diamond pattern steel.
 - All hinges shall have hidden/internal mounting points.
 - All stainless steel shall be sandblasted after fabrication to remove burrs, flashing and sharp edges.
 - There shall be no exposed ends of expanded metal on the outside of the enclosure.
 - Welding shall be a minimum of 1/4" long welds on 4" spacing.
 - Hardware kits provided for mounting enclosures. See HK-300/HK-700 for hardware specifications.
 - On 304 S.S. units, all hinges, exposed hardware, and brackets shall be 304 S.S.
 - All hardware shall be securely attached to enclosures.
 - All enclosures shall withstand a minimum of 200 lbs. per square foot without any permanent deflection or distortion.
 - 3/8" spacing between angle iron framework of enclosure and slab to prevent rusting. Only pipe ends to touch slab.

- ### STANDARD GUARDSHACK™ AND COAST GUARDSHACK™ SIZES INTERNAL DIMENSIONS
- | Model | Width | Height | Length |
|--------|-------|--------|--------|
| GS - 5 | 24" W | 40" H | 66" L |
- ### POWDERCOATED UNITS
- Pre-powdercoat Treatment Process
Clean Guardshack™ unit with a S-44 alkaline cleaner, overflow rinse, apply an AC-8115 iron phosphate treatment, overflow rinse and finish with a #196 sealer rinse to prevent rusting and improving adhesion.
- Powdercoat Treatment Process
Units shall be preheated and coated by electrostatic application of 2.0 to 3.5 mil thickness on all surfaces. Powder shall be RAL 1019 Woodlands Tan or TCI 8810-6058 Forest Green or approved equal Impact Resistance Finish 160 inch pounds direct 160 inch pounds reverse, per ASTM D-2794 specs. Gloss Finish >85, per ASTM D-523. Adhesion to be rated excellent when tested to ASTM D-3359 standards.

GUARDSHACK ENCLOSURE
DETAILS / SPECIFICATIONS
NOT TO SCALE



- ### LEGEND
- IRRIGATION LINE
 - GEOTHERMAL WELL LOCATION
 - 6' RADIUS GEOTHERMAL WELL BUFFER AREA
 - DRILLED SHAFT FOUNDATIONS FOR FUTURE PARKING GARAGE

BVH
ARCHITECT
BVH ARCHITECTURE
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PROJECT: OCC 001405
BY: L14877
DATE: APRIL 23 2018
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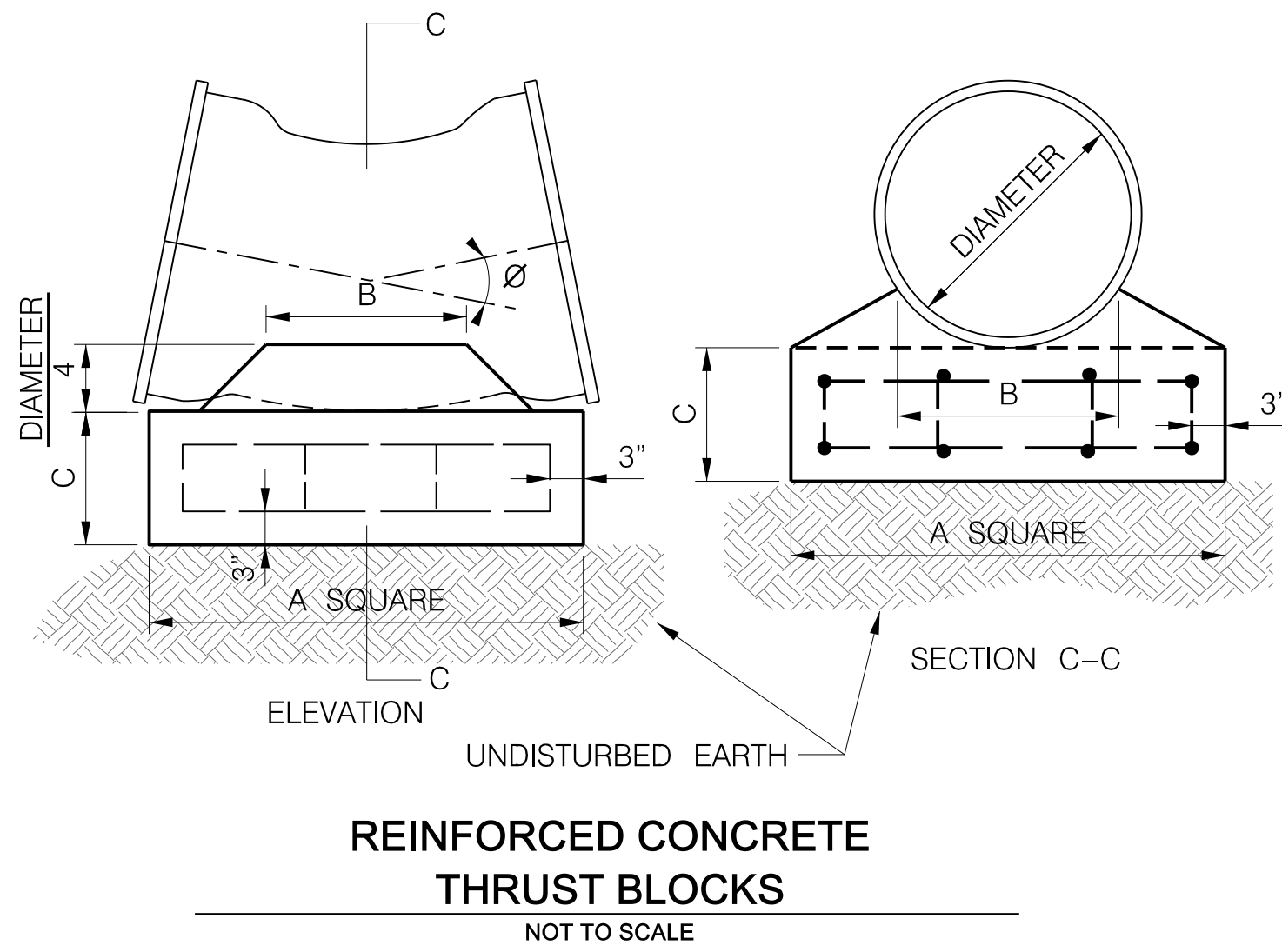
**PHASE B ALTERNATE 3:
PARKING LOT AREA IRRIGATION
CONSTRUCTION PLAN**

**ALT-3
C9.5
PB**

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REINFORCED CONCRETE THRUST BLOCK															
DIAMETER	Ø=11 1/4"							DIAMETER	Ø=22 1/2"						
	A	B	C	BAR SIZE	NUMBER OF BARS EACH WAY	STEEL (LBS.)	CONCRETE CUBIC YARDS		A	B	C	BAR SIZE	NUMBER OF BARS EACH WAY	STEEL (LBS.)	CONCRETE CUBIC YARDS
6	1'-3"	0'-9"	1'-0"	-	-	-	0.1	6	1'-6"	0'-9"	1'-0"	-	-	-	0.1
8	1'-6"	1'-0"	1'-0"	-	-	-	0.1	8	1'-6"	1'-0"	1'-0"	-	-	-	0.1
12	1'-6"	1'-0"	1'-0"	NO 4	3	4.0	0.1	12	2'-3"	1'-0"	1'-0"	NO 4	3	7.0	0.2
16	2'-3"	1'-0"	1'-0"	NO 4	3	7.0	0.2	16	3'-0"	1'-0"	1'-0"	NO 4	5	16.7	0.4
20	2'-9"	1'-3"	1'-0"	NO 4	4	12.0	0.4	20	3'-9"	1'-3"	1'-0"	NO 4	7	30.4	0.6
24	3'-3"	1'-6"	1'-0"	NO 4	6	22.0	0.5	24	4'-6"	1'-6"	1'-3"	NO 5	6	50.1	1.1
30	4'-0"	2'-0"	1'-3"	NO 4	7	32.7	0.9	30	5'-6"	2'-0"	1'-6"	NO 5	9	93.9	1.9
36	4'-9"	2'-6"	1'-3"	NO 5	7	62.0	1.3	36	6'-9"	2'-6"	1'-9"	NO 5	12	169.5	3.3
48	6'-6"	3'-3"	1'-6"	NO 5	13	162.7	1.9	48	9'-0"	3'-3"	2'-0"	NO 10	6	438.9	6.7

DIAMETER	Ø=45"							DIAMETER	Ø=90"						
	A	B	C	BAR SIZE	NUMBER OF BARS EACH WAY	STEEL (LBS.)	CONCRETE CUBIC YARDS		A	B	C	BAR SIZE	NUMBER OF BARS EACH WAY	STEEL (LBS.)	CONCRETE CUBIC YARDS
6	1'-9"	1'-0"	1'-0"	-	-	-	0.2	6	2'-3"	1'-0"	1'-0"	-	-	-	0.2
8	2'-3"	1'-0"	1'-0"	-	-	-	0.2	8	3'-0"	1'-0"	1'-0"	-	-	-	0.4
12	3'-3"	1'-0"	1'-0"	NO 4	6	22.0	0.4	12	4'-3"	1'-0"	1'-3"	NO 5	6	47.0	0.9
16	4'-3"	1'-0"	1'-3"	NO 5	6	46.9	0.9	16	5'-9"	1'-0"	1'-6"	NO 5	10	109.5	2.0
20	5'-3"	1'-3"	1'-6"	NO 5	8	79.3	1.6	20	7'-0"	1'-3"	1'-9"	NO 5	15	203.4	3.3
24	6'-3"	1'-6"	1'-6"	NO 5	11	131.9	2.3	24	8'-6"	1'-6"	2'-0"	NO 6	15	360.5	5.6
30	7'-9"	2'-0"	1'-9"	NO 7	9	266.7	4.1	30	10'-6"	2'-0"	2'-3"	NO 9	10	680.0	9.5
36	9'-3"	2'-6"	2'-0"	NO 7	14	500.8	6.8	36	12'-6"	2'-6"	2'-9"	NO 10	11	1136.0	16.3
48	12'-3"	3'-3"	2'-6"	NO 10	11	1112.3	14.8	48	16'-9"	3'-3"	3'-6"	NO 11	16	2763.0	37.2



REINFORCED CONCRETE THRUST BLOCKS
NOT TO SCALE

GENERAL NOTES:

ALL REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO A. S. T. M. SERIAL DESIGNATION A-305-507 AND SHALL SATISFY THE BEND TEST REQUIREMENTS FOR STRUCTURAL GRADE STEEL IN ACCORDANCE WITH THE REQUIREMENTS.

ALL CONCRETE SHALL BE MINIMUM 3500 PSI 28-DAY COMPRESSIVE STRENGTH & IN CONFORMANCE WITH SPECIFICATION SECTION 033000 CAST IN PLACE CONCRETE.

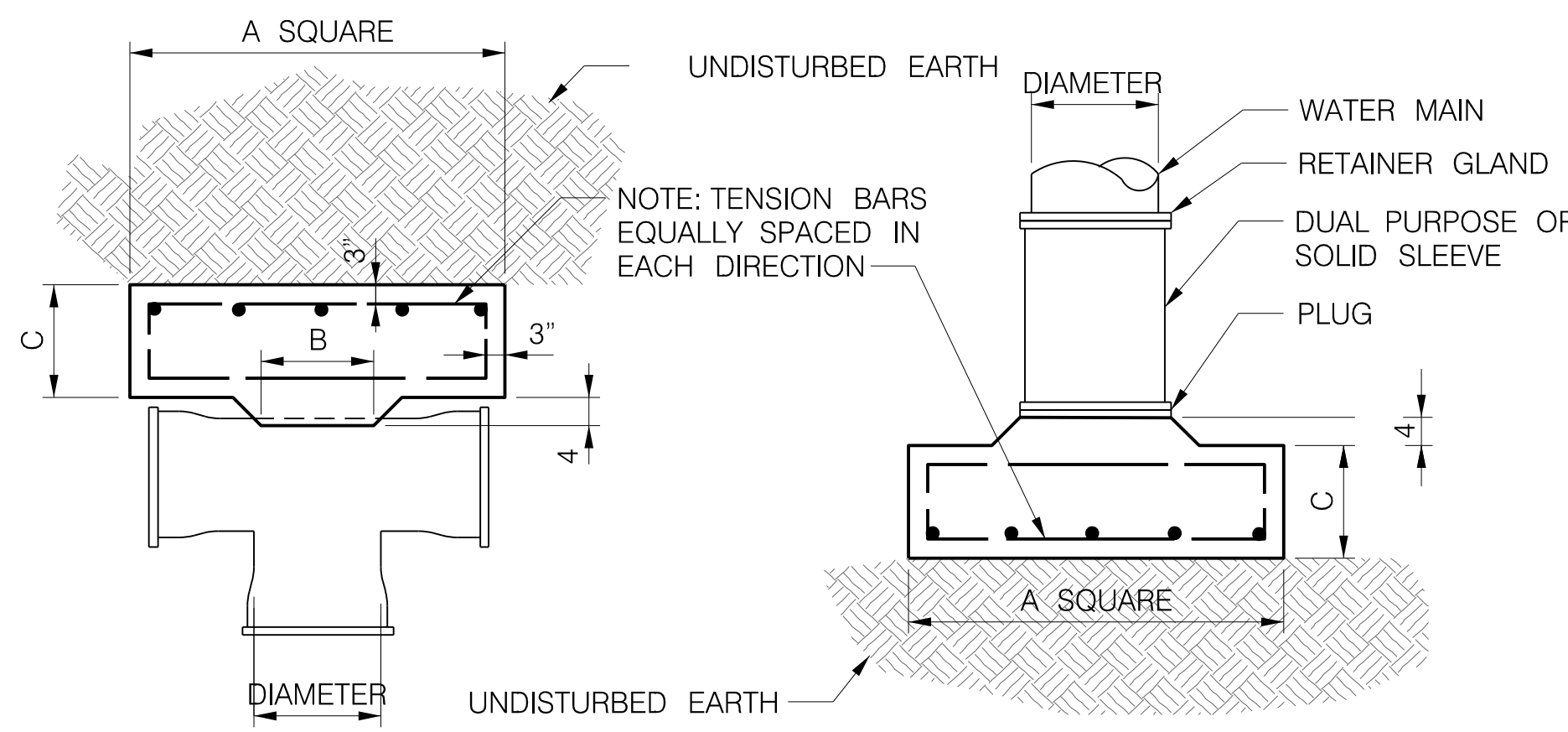
ALL CONCRETE COLLARS SHALL BE CONSTRUCTED SUCH THAT THEY ARE ANCHORED AGAINST UNDISTURBED SOIL.

MINIMUM DEPTH OF EMBEDMENT FOR REINFORCING STEEL TO BE AS NOTED.

ALL REINFORCING STEEL SHALL BE EPOXY COATED.

POURED IN PLACE THRUST BLOCKING SHALL BE PROPERLY FORMED TO THE STATED DIMENSIONS AND SHALL NOT ENCASE THE M.J. BOLTS AND FASTENERS.

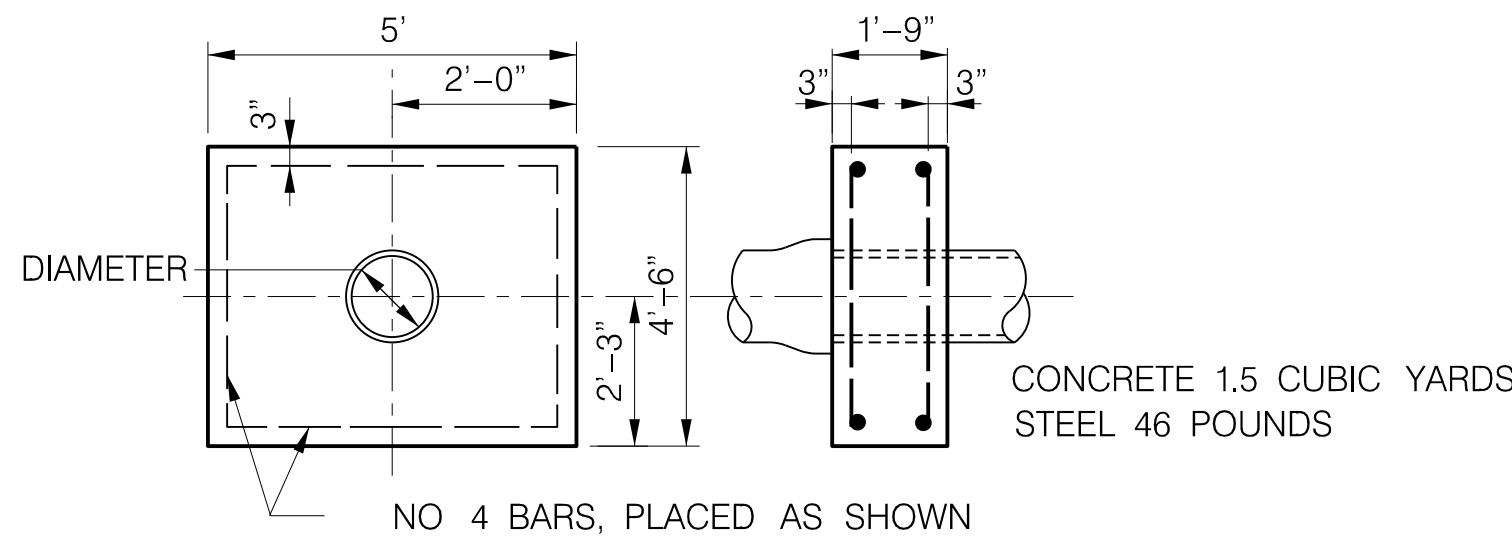
THRUST COLLARS FOR REDUCERS SHALL BE INSTALLED ON THE SMALL PIPE SIDE OF A REDUCER, HOWEVER THE SIZE SHALL BE BASED OFF OF THE LARGER DIAMETER PIPE.



REINFORCED CONCRETE TEE BLOCK
NOT TO SCALE

REINFORCED CONCRETE PLUG BLOCK
NOT TO SCALE

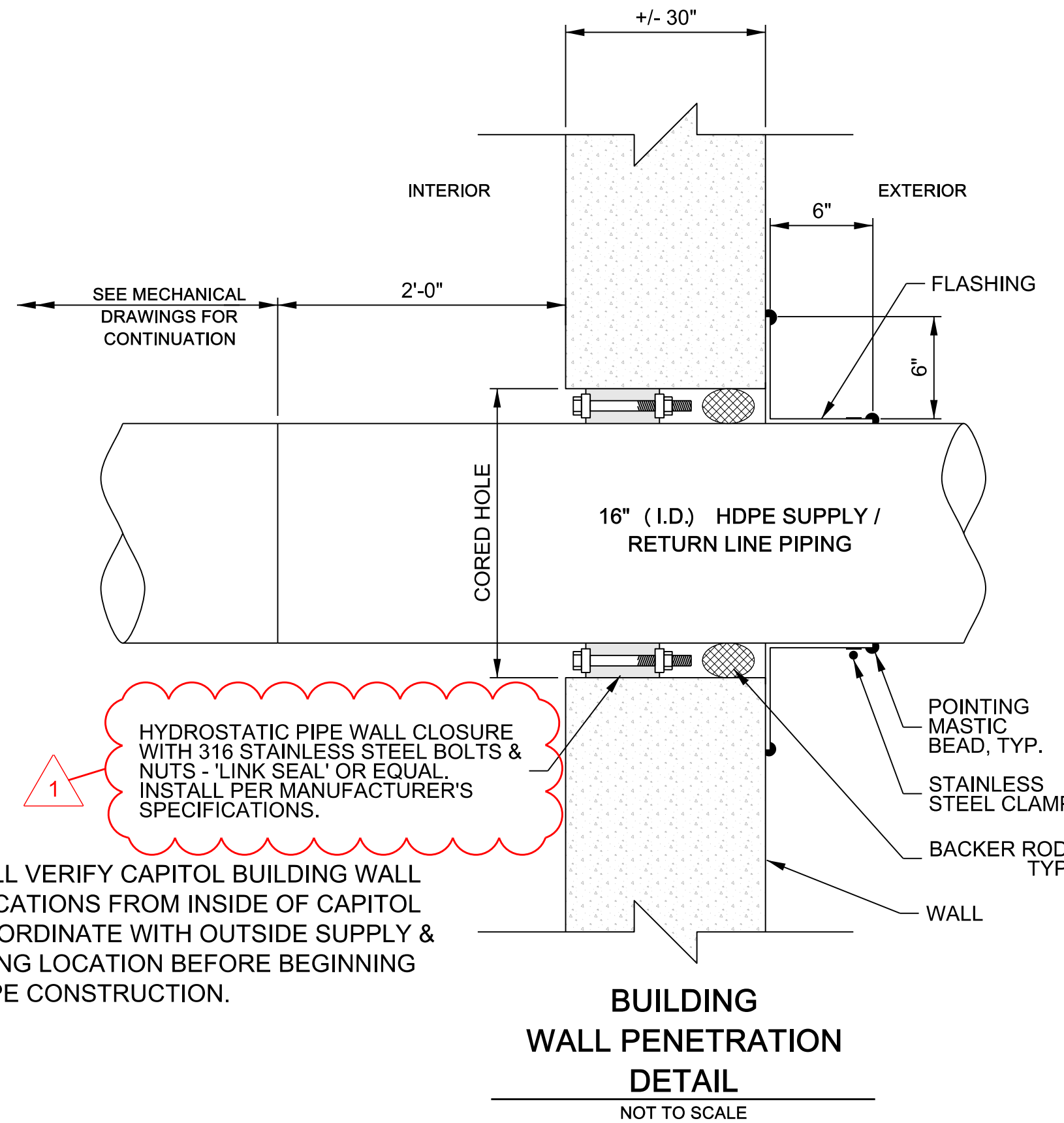
REINFORCED CONCRETE TEE BLOCK AND PLUG BLOCK							
DIAMETER	A	B	C	BAR SIZE	NUMBER OF BARS EACH WAY	STEEL (LBS.)	CONCRETE CUBIC YARDS
6	1'-9"	0'-8"	0'-8"	-	-	-	0.1
8	2'-3"	0'-9"	0'-9"	-	-	-	0.2
12	3'-4"	1'-0"	1'-0"	NO 4	6	22.7	0.4
16	4'-6"	1'-3"	1'-3"	NO 4	8	42.8	1.0
20	5'-8"	1'-6"	1'-6"	NO 5	8	86.8	1.9
24	6'-9"	1'-9"	1'-9"	NO 5	11	143.5	3.1
30	8'-6"	2'-6"	2'-0"	NO 5	16	267.0	5.5
36	10'-0"	3'-0"	2'-6"	NO 6	15	428.0	9.5
48	13'-6"	4'-0"	3'-0"	NO 7	20	1063.0	21.2



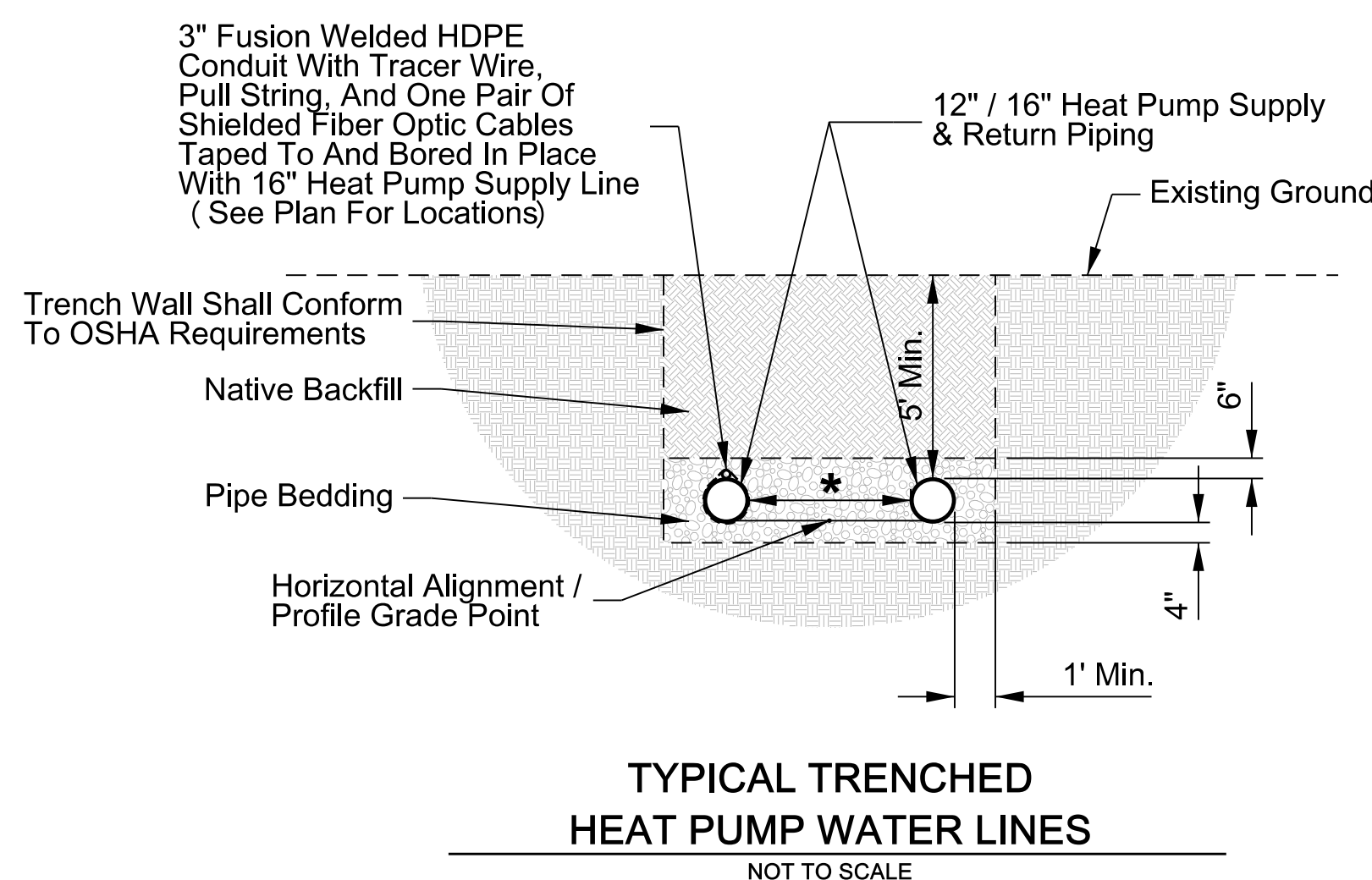
REINFORCED CONCRETE COLLARS (12" / 16" DIA. PIPE)
NOT TO SCALE

REINFORCED CONCRETE COLLARS

NOTE: R.C. THRUST COLLARS TO BE BUILT ADJACENT TO VALVES, AT THE SPIGOT SIDE OF LAST PIPE CONNECTION OR ADJACENT TO THE SMALLER DIAMETER SIDE OF M.J. REDUCERS.

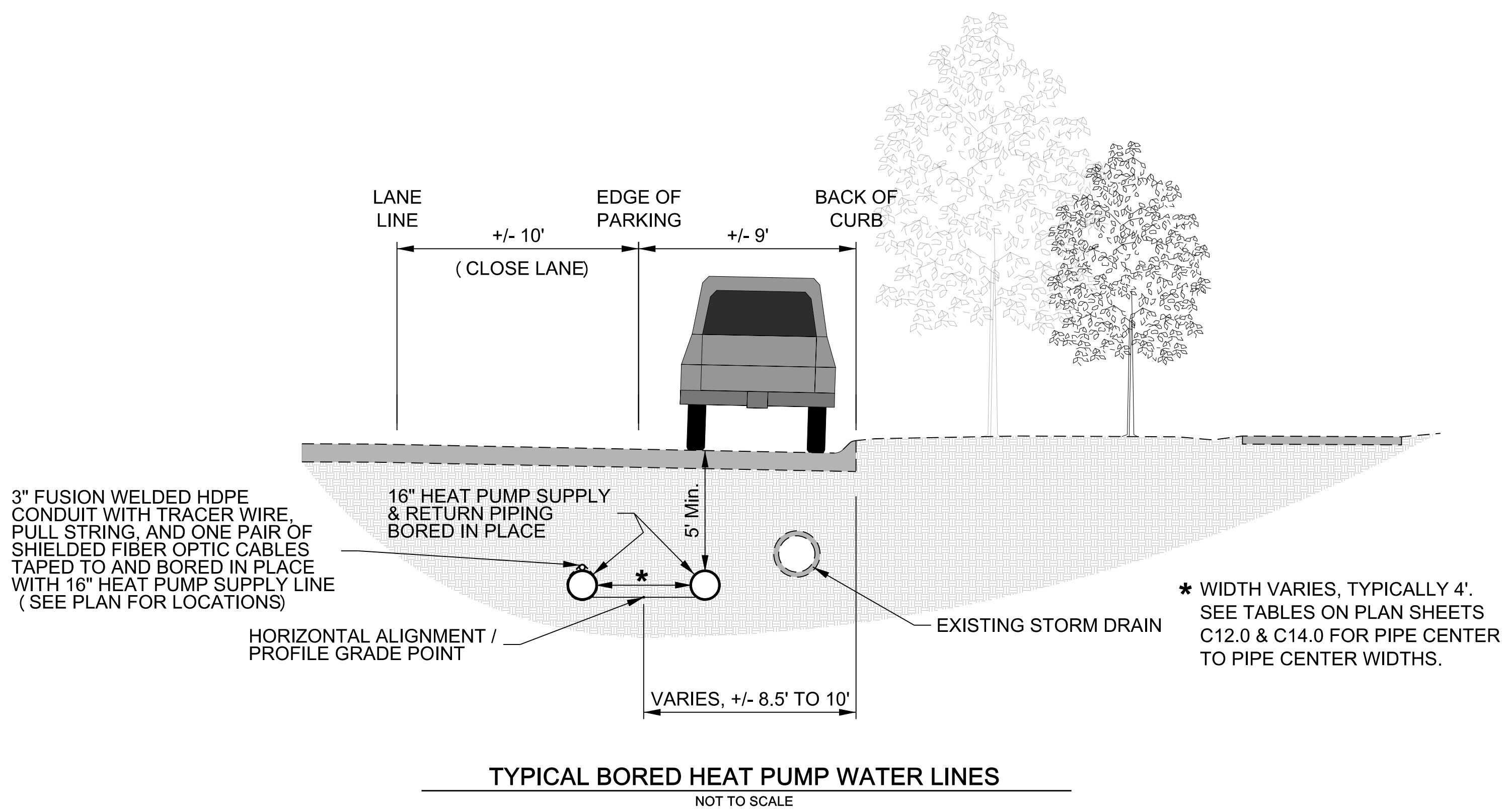


NOTE: CONTACTOR SHALL VERIFY CAPITOL BUILDING WALL PENETRATION LOCATIONS FROM INSIDE OF CAPITOL BUILDING AND COORDINATE WITH OUTSIDE SUPPLY & RETURN LINE PIPING LOCATION BEFORE BEGINNING OPEN TRENCH PIPE CONSTRUCTION.



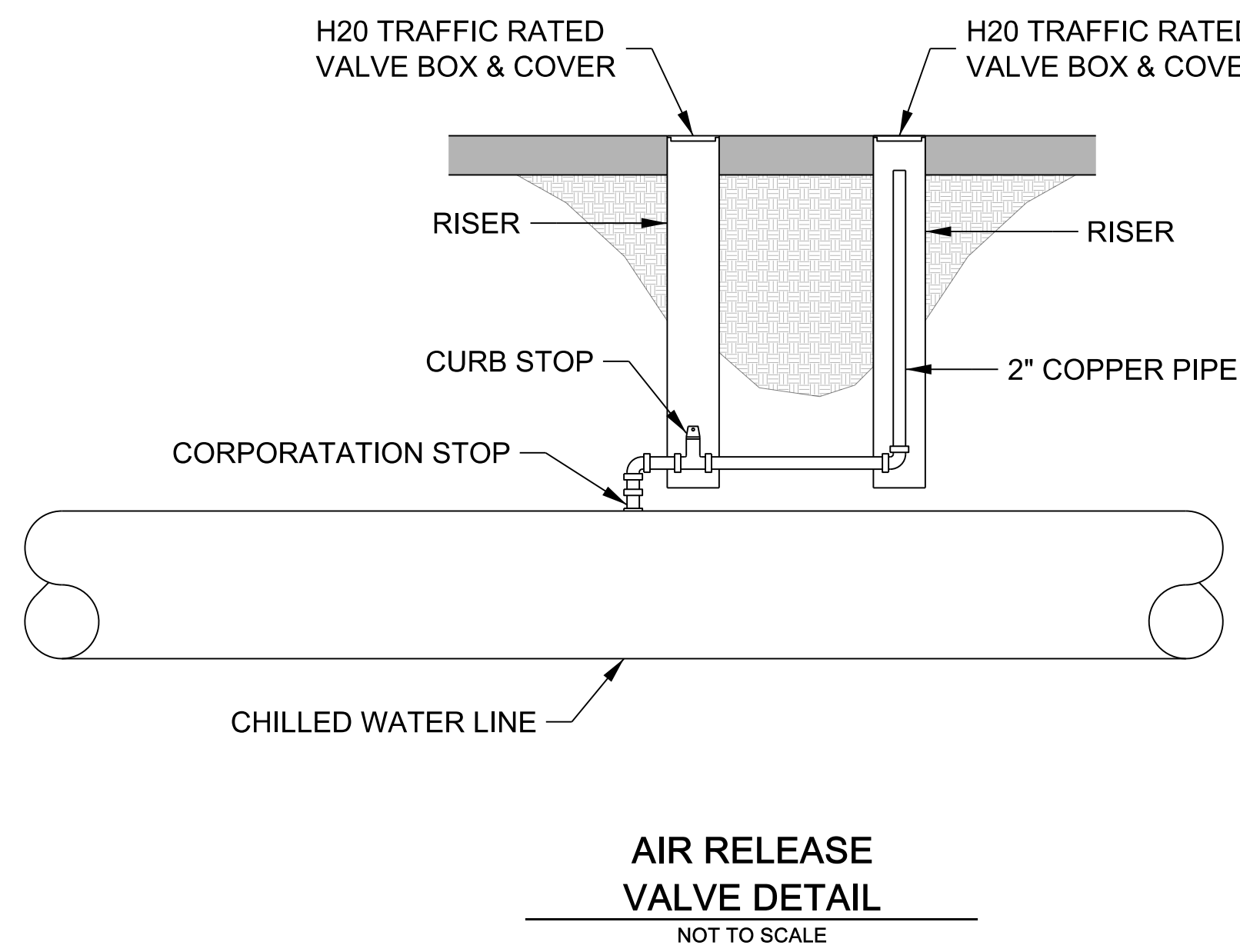
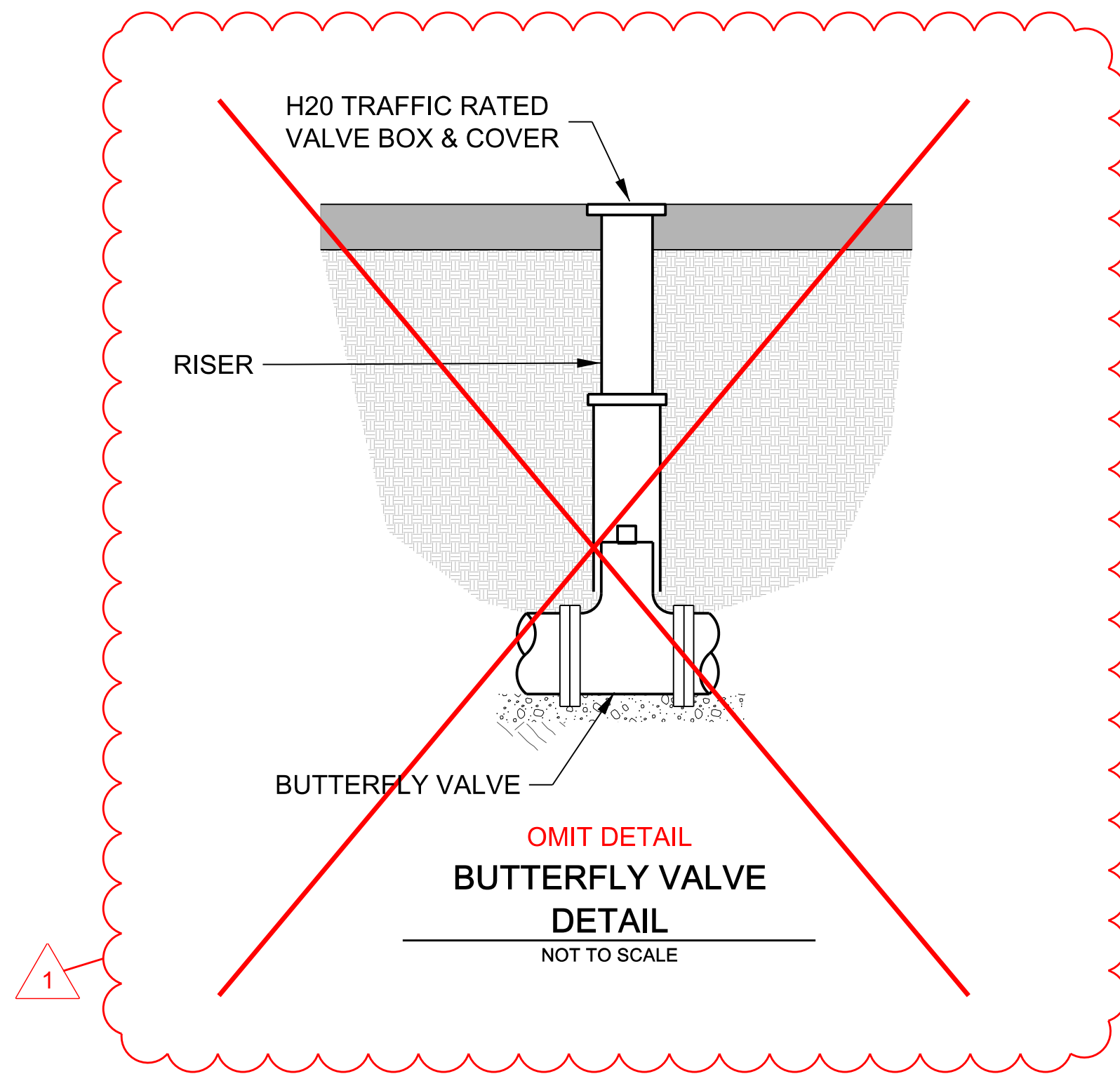
TYPICAL TRENCHED HEAT PUMP WATER LINES
NOT TO SCALE

* Width Varies. See Tables On Plan Sheets C12.0 & C14.0 For Pipe Center To Pipe Center Widths.



TYPICAL BORED HEAT PUMP WATER LINES
NOT TO SCALE

* WIDTH VARIES, TYPICALLY 4'. SEE TABLES ON PLAN SHEETS C12.0 & C14.0 FOR PIPE CENTER TO PIPE CENTER WIDTHS.



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1	5/16/2018	ADDENDUM #5

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REPLACEMENT AND WINDOW
RESTORATION

PROJECT: OCC 201405
BVH 114877
DATE: APRIL 23, 2018
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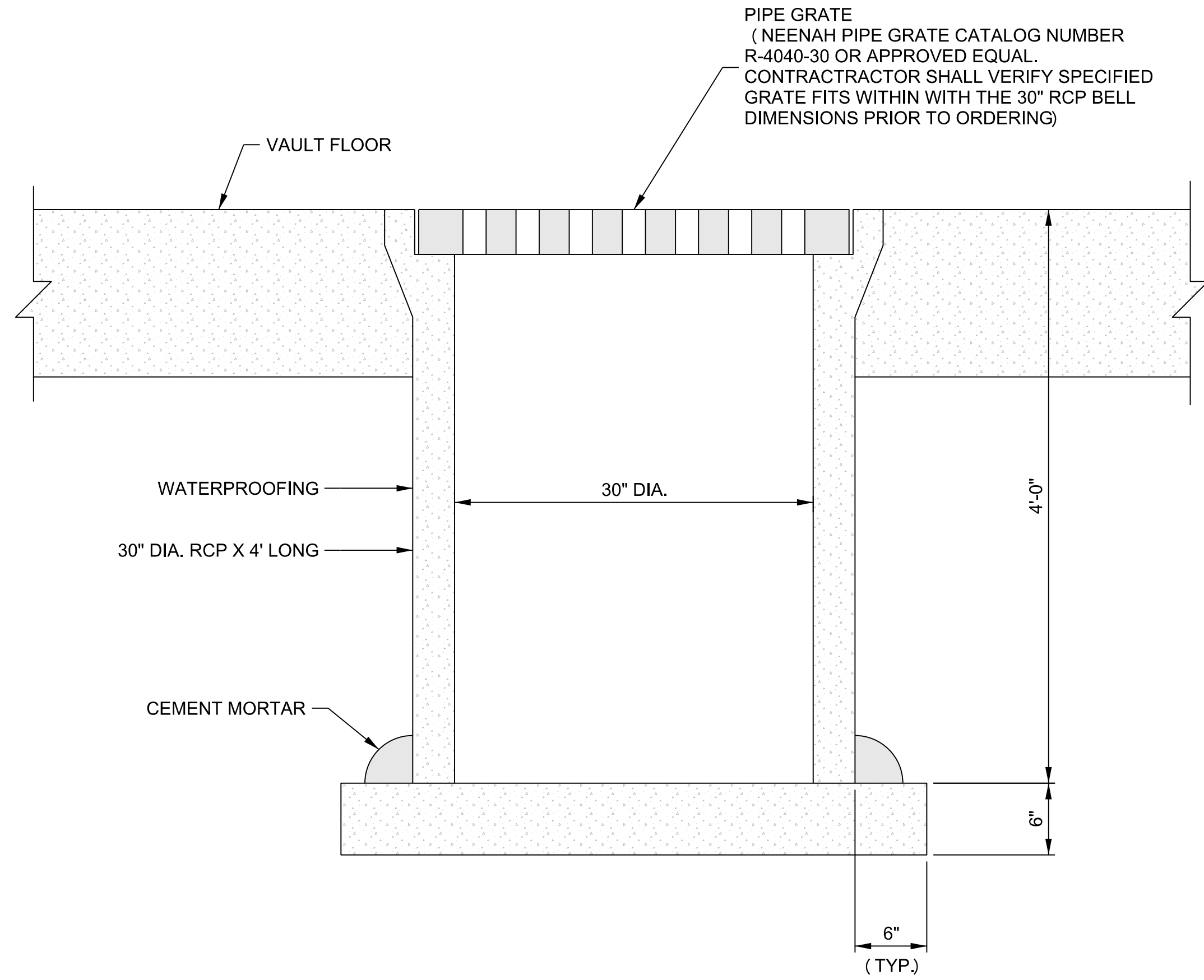
HEAT PUMP
SUPPLY & RETURN
LINE DETAILS

NORTH

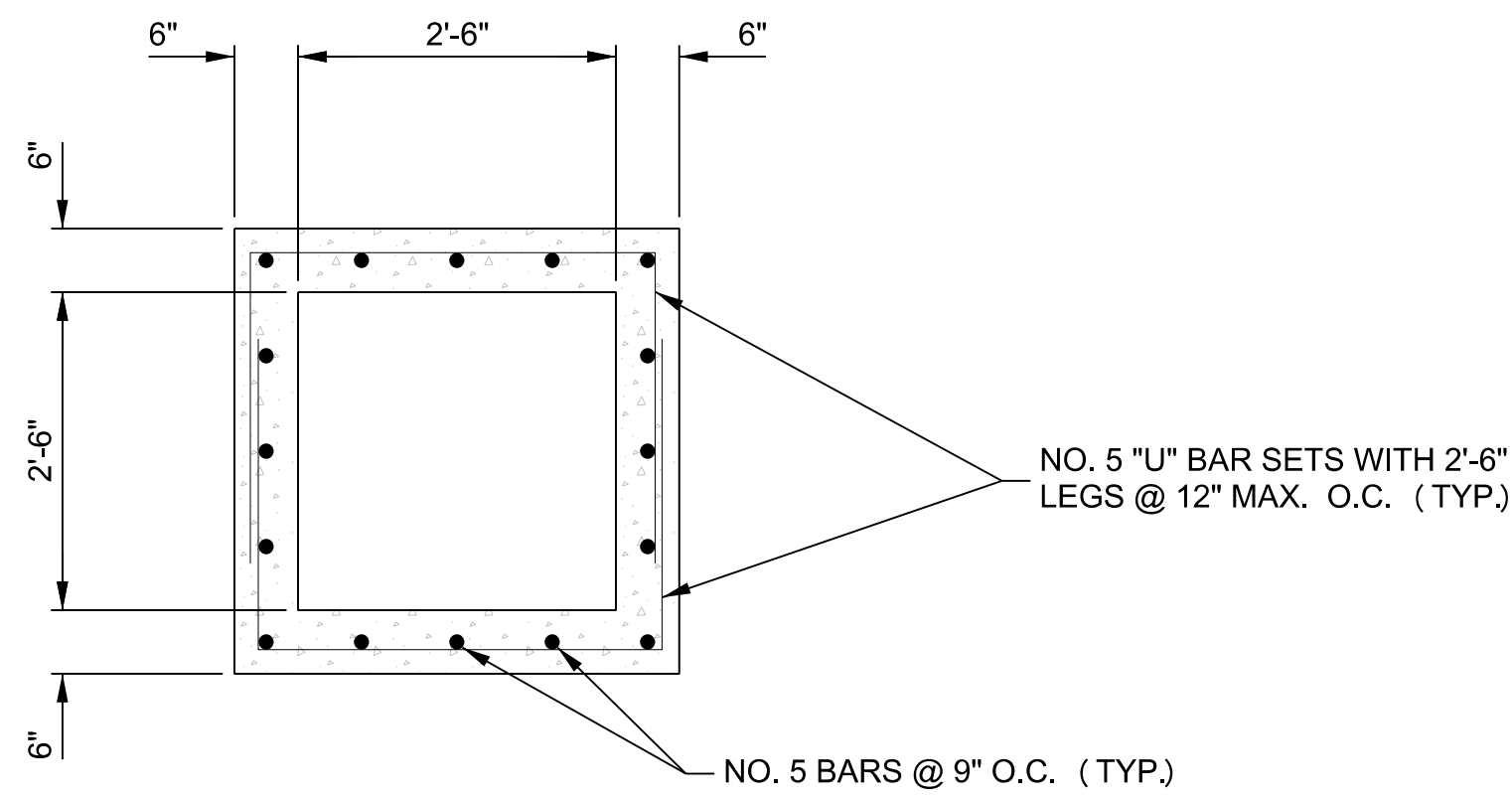


C17.0
PB

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VAULT SUMP PUMP
BASIN DETAIL
NOT TO SCALE



NOTE: SEE ARCHITECTURAL PLANS FOR LADDER

VAULT ACCESS
RISER DETAILS
NOT TO SCALE

VAULT GENERAL NOTES

ALL REINFORCING STEEL SHALL BE EPOXY COATED AND CONFORM TO THE REQUIREMENTS OF ASTM A615/A615M, GRADE 60 STEEL.

ALL CONCRETE SHALL HAVE A MINIMUM 3500 PSI 28-DAY COMPRESSIVE STRENGTH & BE IN CONFORMANCE WITH SPECIFICATION SECTION 033000 CAST IN PLACE CONCRETE.

MINIMUM DEPTH OF EMBEDMENT FOR REINFORCING STEEL SHALL BE 2" UNLESS OTHERWISE INDICATED.

THE CAST IRON MANHOLE RING AND COVER SHALL BE SET IN A BED OF MORTAR, AND CAREFULLY ADJUSTED TO PROPOSED GRADE.

EACH VAULT SHALL INCLUDE A CAST IRON COVER AND FRAME.

CASTING SHALL CONFORM TO THE REQUIREMENTS OF "SPECIFICATIONS FOR GRAY IRON CASTING" IN ACCORDANCE WITH A.S.T.M. DESIGNATION A-48-83; CLASS 35B

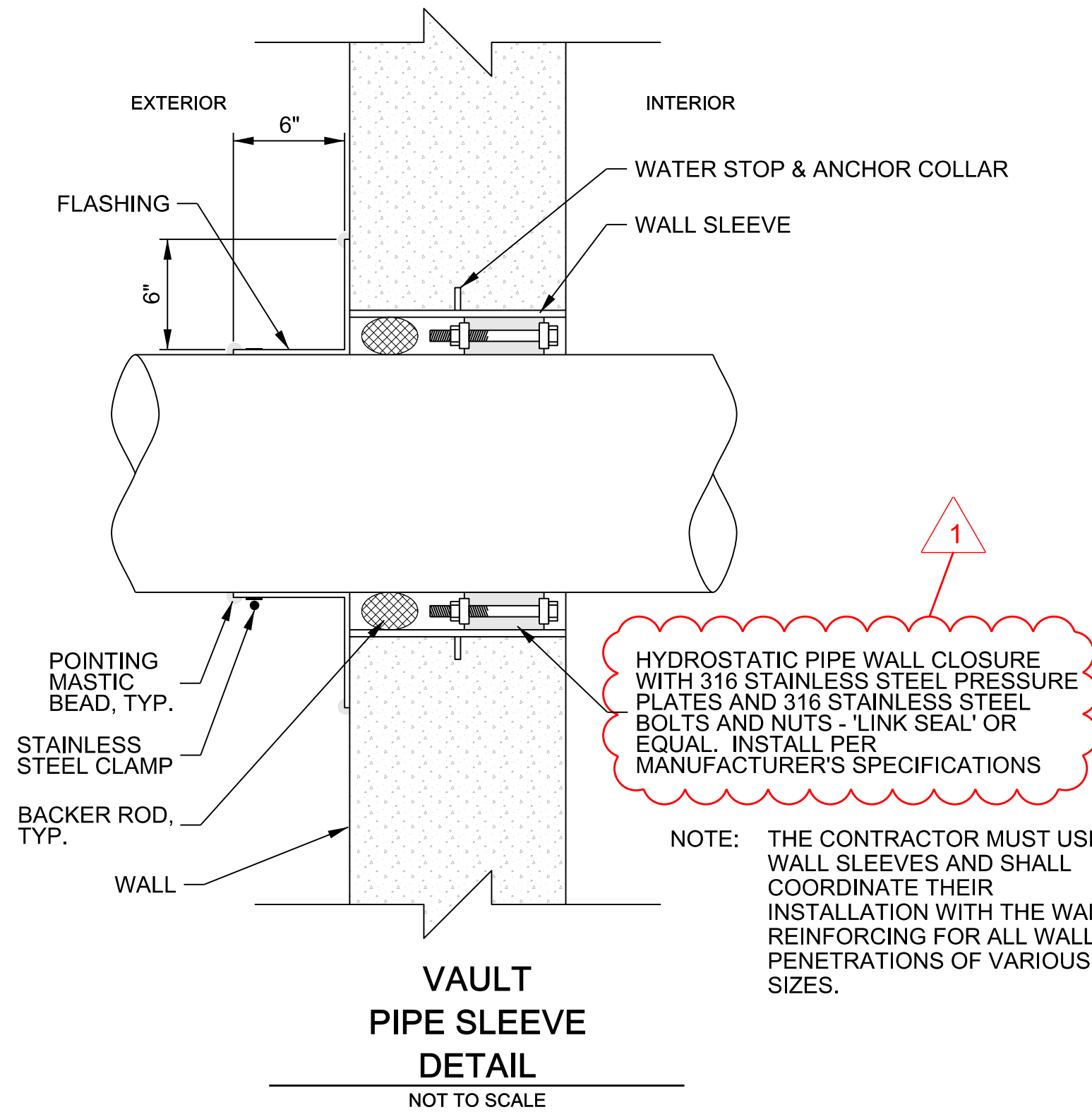
CASTINGS ARE TO BE MANUFACTURED TRUE TO PATTERN WITH SATISFACTORY FIT OF COMPONENT PARTS. CASTINGS SHALL BE FREE OF DEFECTS. DIMENSIONS AS DETAILED ON PLAN SHALL NOT DEVIATE BY +/- 1/16" PER FOOT.

CASTING SHALL BE FURNISHED WITH MACHINED HORIZONTAL BEARING SURFACES.

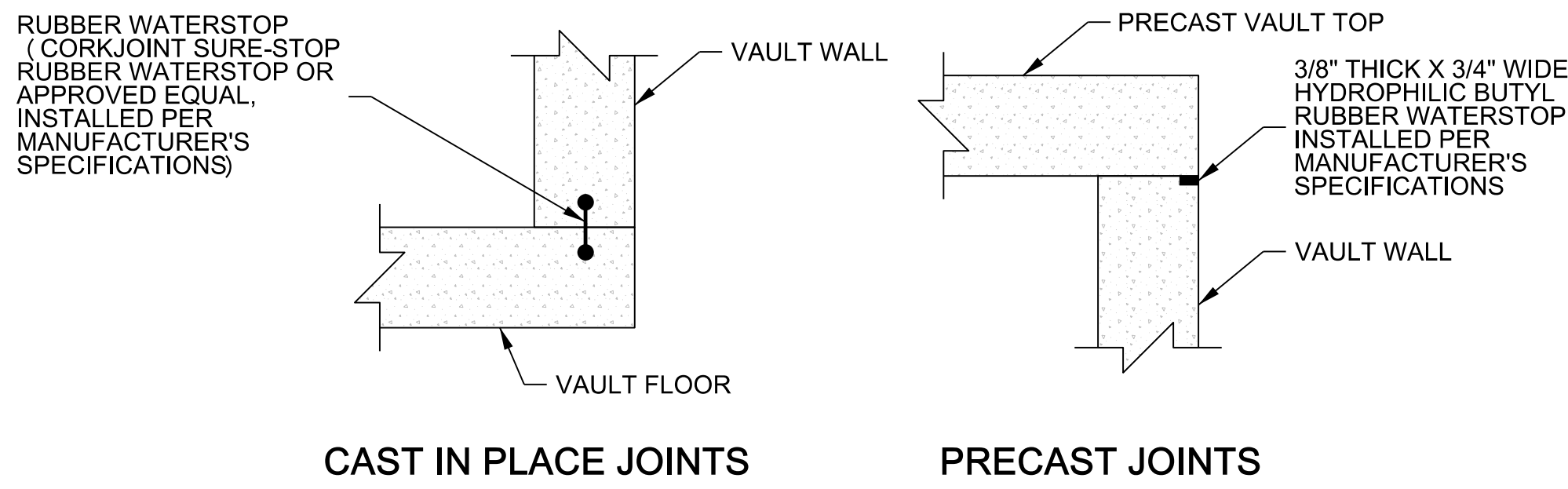
CASTING SHALL BE RATED "HEAVY DUTY" SUITABLE FOR H-20 TRAFFIC LOADING.

NOMINAL PIPE SIZES PENETRATING THE VAULT WALLS ARE SHOWN IN THE DETAILS. HOLE SHALL BE ADEQUATELY SIZED TO ACCEPT THE PIPE WITH A PIPE SLEEVE. AS DETAILED ON THIS SHEET. ALL PIPE PENETRATIONS SHALL HAVE A PIPE SLEEVE.

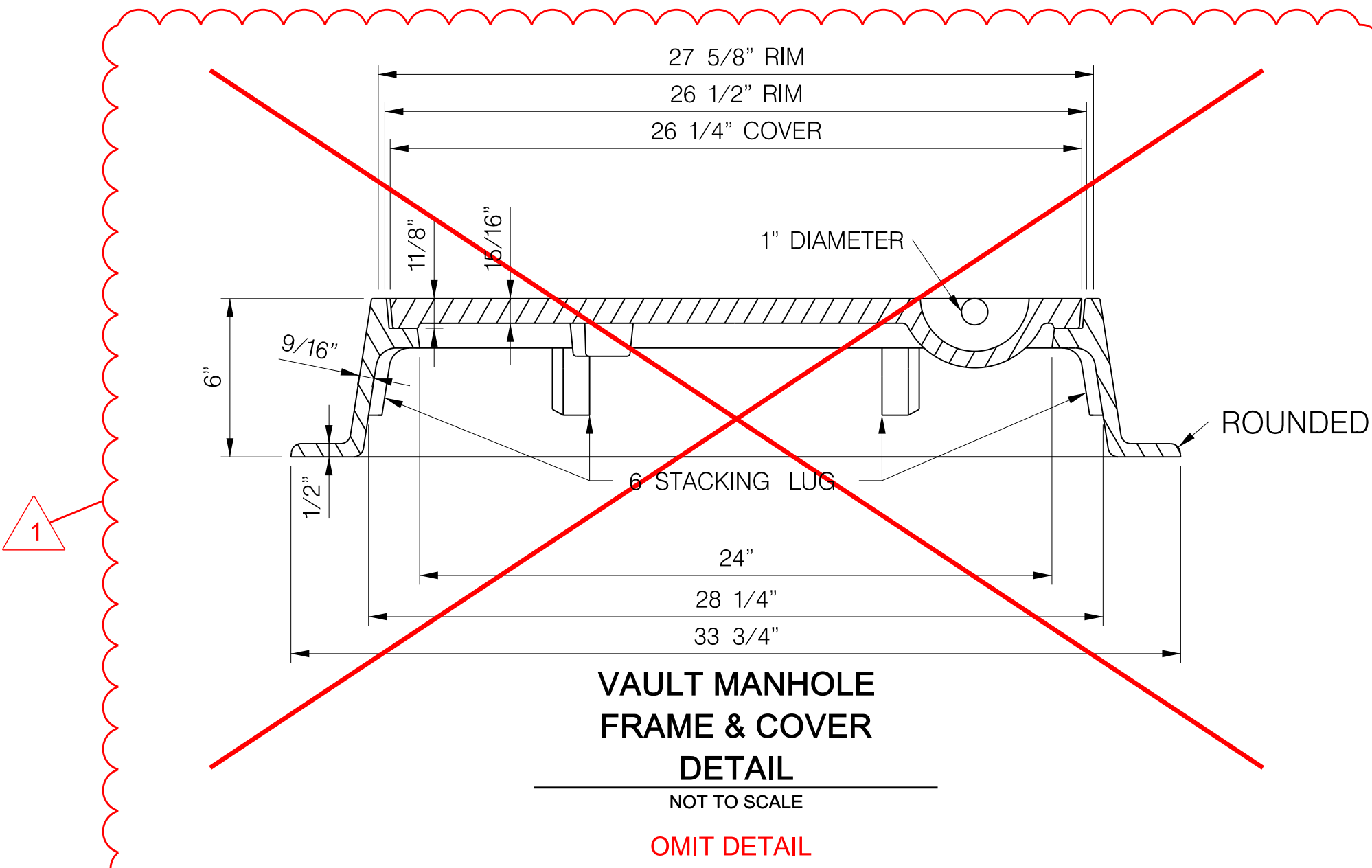
WATER PROOFING - SEE ARCHITECTURAL.



NOTE: THE CONTRACTOR MUST USE WALL SLEEVES AND SHALL COORDINATE THEIR INSTALLATION WITH THE WALL REINFORCING FOR ALL WALL PENETRATIONS OF VARIOUS SIZES.



VAULT WATERSTOP
DETAIL
NOT TO SCALE



VAULT MANHOLE
FRAME & COVER
DETAIL
NOT TO SCALE
OMIT DETAIL

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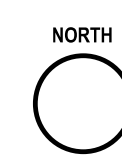
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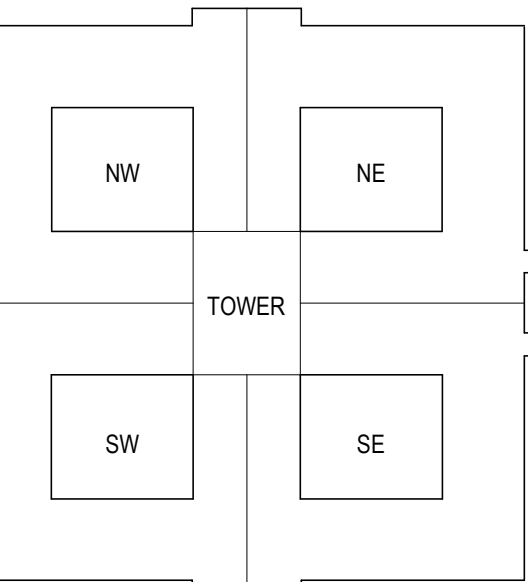


VAULT DETAILS
(TYPICAL VAULT DETAILS)



C21.2
PB

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1	05/14/2018	ADDENDUM #4
2	5/18/2018	ADDENDUM #5



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FOUNDATION PLAN



**51.0
PA**

