ADDENDUM NO. 3

State of Maine Cultural Building Asbestos Abatement & Mechanical Upgrades
Phase 2: Mechanical Upgrades & Museum Abatement
230 State Street
Augusta, ME

February 17, 2022

From: Wood
Environment & Infrastructure Solutions
511 Congress Street
Portland, Maine 04101

To: Prospective Bidders

This Addendum forms a part of the Contract Documents and modifies the original bidding documents dated January 7, 2022, as noted below. Bidder shall acknowledge receipt of this Addendum in the space provided on the Contractor Bid Form, failure to do so may subject the bidder to disqualification.

PERTAINING TO REQUEST FOR INFORMATION QUESTIONS
Responses to RFIs received from 2/1 through 2/10 are included with this addendum.

PERTAINING TO SPECIFICATIONS

1. Section 00 11 13 Notice to Contractors for Email

    a) DELETE section in its entirety, ADD the Section 00 11 13 Notice to Contractors for Email attached to this addendum.

2. Section 011000 Summary.

    a) DELETE section in its entirety, ADD the Section 011000 Summary attached to this addendum.

3. Section 017900 Demonstration and Training

    a) DELETE section in its entirety, ADD the Section 017900 Demonstration and Training attached to this addendum.

4. Section 019113 General Commissioning Requirements.

    a) DELETE section in its entirety, ADD the Section 019113 General Commissioning Requirements attached to this addendum.

5. Section 024119 Selective Demolition

    a) DELETE section in its entirety, ADD the Section 024119 Selective Demolition attached to this addendum.

6. Section 230800 Commissioning of HVAC.

    a) DELETE section in its entirety, ADD the Section 230800 Commissioning of HVAC attached to this addendum.

PERTAINING TO THE DRAWINGS

DELETE sheets listed below and ADD drawings attached to this addendum.

1. Drawing GI004B:
    a) Added Bid Alternate #5 to deduct the scope for abatement and associated demolition of the 4th floor Mechanical Room 416 in its entirety.
2. Drawing GC100B:
    a) Revised contractor access dates
3. Drawing GC101B:
    a) Revised contractor access dates
4. Drawing GC102B:
    a) Revised contractor access dates
5. Drawing GC103B:
    a) Revised contractor access dates
6. Drawing GC104B:
    a) Revised contractor access dates
7. Drawing GC105B:
    a) Revised contractor access dates
8. Drawing AD105:
    a) Removed rigid insulation at loading dock roof overhang (New Keynote 47).
9. Drawing AD109:
    a) Removed existing soffit at roof overhang.
10. Drawing AE122:
    a) Revised Diffuser layout per mechanical revisions
11. Drawing AE124:
    a) Revised Diffuser layout per mechanical revisions
12. Drawing AE129:
    a) Added new soffit at roof overhang
13. Drawing AE202:
    a) Revised Elevation
14. Drawing AE203:
    a) Revised Elevation
15. Drawing AE301:
    a) Revised overhang details
16. Drawing AE312:
    a) Change spray-applied fireproofing to rigid board fireproofing

17. Drawing AE512:
    a) Deleted detail
    b) Revised elevations
18. Drawing AE513:
    a) Deleted details
19. Drawing AE621:
    a) Added window type
20. Drawing AK105:
    a) Changed rigid board fireproofing to spray-applied fireproofing at loading dock overhang.
21. Drawing AK107:
    a) Changed rigid board fireproofing to spray-applied fireproofing at exterior soffit.
22. Drawing M-001:
    a) Changes to Piping Symbols.
    b) Added General Note.
23. Drawing MH101:
    a) Corrected Slot Diffuser Tags
24. Drawing MH102:
    a) Added note to Roof Plan clarifying construction of exterior ductwork.
    b) Revised diffusers in 322, 323.
25. Drawing MH104:
    a) Revised diffusers in Revised diffusers in 330, 333, 336, 340, 341, 342.
    b) Reconfigured ductwork in 334.
26. Drawing MH105:
    a) Clarified location of low mounted R-5 gills in Cars & Boats, 140.
27. Drawing MH-106:
    a) Ductwork SA main size increased at vertical chase next to Stair 7.
28. Drawing MH-107:
    a) Ductwork SA mains sizes increased at vertical chase next to Stair 7.
    b) Tagged Exhaust duct riser.
29. Drawing MH-108:
    a) Ductwork SA mains sizes increased at vertical chase next to Stair 7 and into Mech Room 416.
    b) Fire-smoke dampers shown on all duct penetrations into vertical chase next to Stair 7.
    c) Diffuser tags updated in Hall 413, Men 415, Women 414.
30. Drawing M-302:
    a) Made changes to Section: “A1 AHU-1,2,3 SECTION”
    b) Made changes to Section: “B1 AHU-1,3 SECTION”
31. Drawing M-401:
    a) Made changes to Part Plan: “D2 MUSEUM – FOURTH LEVEL MECHANICAL 416 LOWER DUCTWORK PART PLAN”
    b) Added Refrigerant Monitor and Thermostats in Part Plan: “MUSEUM FOURTH LEVEL MECHANICAL 416 LOWER PIPING PART PLAN”.
32. Drawing M-402:

a) Increased Supply Air Duct sizes and modified AHU connections in Part Plan: "D2 MUSEUM – FOURTH LEVEL MECHANICAL 416 UPPER DUCTWORK PART PLAN"

33. Drawing M-403:
    a) Modified HWS and HWR piping sizes in Part Plan: "D4 MECHANICAL ROOM B5 PIPING PART PLAN"
    b) Added Refrigerant Monitor and Thermostat in Part Plan: "A4 ARCHIVE-THIRD LEVEL MECHANICAL 348 PIPING PART PLAN".
34. Drawing M-404:
    a) Added Refrigerant Monitor and Thermostat in Part Plan: "A4 LIBRARY-THIRD LEVEL MECHANICAL 315 PIPING PART PLAN".
35. Drawing M-601:
    a) Revised Supply Air Diffuser Schedule.
    b) Revised Return, Transfer & Exhaust Grille Schedule.
36. Drawing M-602:
    a) Revised Air Separator Schedule.
37. Drawing M-603:
    a) Added MERV13 to FCU-05-05 to Fan Coil Unit Schedule.
38. Drawing M-604:
    a) Revised Pump Schedule operating points.
    b) Revised Heat Exchanger Schedule operating points.
    c) Revised Expansion Tank Schedule design points.
39. Drawing M-605:
    a) Added Note 12 to Air Handling Unit Schedule.
40. Drawing M-706:
    a) Added Duct Pressure Sensor to Control Diagram: "E1 ERV-1,2,3 CONTROL DIAGRAM"
    b) Added Duct Pressure Sensor to Control Diagram: "D1 ERV-4 CONTROL DIAGRAM"
    c) Added Sensors to Control Diagram "A1 AHU-4 CONTOL DIAGRAM"
    d) Made changes to Control Diagram "D4 AHU-3 CONTROL DIAGRAM"
    e) Made changes to Control Diagram "A4 AHU-1, 2 CONTROL DIAGRAM"
41. Drawing M-707:
    a) Revised Sequence of Operation
42. Drawing M-708:
    a) Revised Sequence of Operation
43. Drawing M-709
    a) Revised Sequence of Operation

END OF ADDENDUM NO. 3

State of Maine Cultural Building Asbestos Abatement & Mechanical Upgrades
Phase 2: Mechanical Upgrades & Museum Abatement
Pre-Bid Questions

Question No.	Discipline	Question	Date Received	Response
18	Architectural	It looks like the spec 088000 - Glazing sections 3.8, 3.9, 3.10 has many glass types listed but only partially described. Glass types are not outlined anywhere within the plans other than vision glass or "opaque" glass/spandrel. Will this be clarified?	2/1/2022	Glass Types are to be 1 inch insulated glazing – clear and ¼" black spandrel glass. Tempered as per code requirements
19	Architectural	Will a stand-alone mock-up be required for this project regarding storefront and curtainwall as the spec lays out? (see 084413-1.6-A, 084113-1.6-A	2/1/2022	the intent of the mock up was to build one in place as part of the work , to then be the standard
20	Architectural	Will a laboratory mock-up and test report for storefront (084113) and curtainwall (084431) truly be required? These systems have been generally tested in labs and have reports readily available as an alternative.	2/1/2022	Manufacturers tests reports are satisfactory
21	General	When will the selected GC be able to start work? I had March/April in my notes for a 15 month total duration to complete by the stated June 2023, but would like to confirm.	2/2/2022	Refer to Specification sections and Drawings issued with addendum No. 3 for clarification.
22	Structural	We are having difficulty finding a AISC certified steel fabricator to bid the work. We are asking that the AISC certification requirement be	2/3/2022	AISC Certification requirements are to remain.
23	Architectural	What are the opening tag, door material, frame material, or frame type for the first unknown opening on door schedule?	2/3/2022	Door schedule has been revised and was issued with addendum No. 2
24	Architectural	What are the locations of openings 230, 240, 244, 245, 246, 247, 248, and 260 on the floor plans?	2/3/2022	Door schedule has been revised and was issued with addendum No. 2
25	Architectural	What do door types 79, 152, G, H, J, and K indicate on openings 126b, 137a, 137b, 137c, 137d, 233, 234a, 234b, 245, 246, 247, 348a, 356, and 434?	2/3/2022	Door schedule has been revised and was issued with addendum No. 2
26	Architectural	What is the door material for openings 126b, 245, 246, 247, 248, 260, 356, and 434?	2/3/2022	Door schedule has been revised and was issued with addendum No. 2
27	Architectural	What are the frame material and frame types for openings 126a, 126b, 137a, 137b, 137c, 137d, 230, 240, 245, 246, 247, 248, 260, 315, 348b, 248c, 356, and 434?	2/3/2022	Door schedule has been revised and was issued with addendum No. 2
28	Architectural	Door Schedule list both HM and STL doors. Are they the same? Only types A and B are drawn Other type are listed on the schedule. Seven doors do not list a type. Fire rating listed as 1 or 2. Is that hours?	2/4/2022	Door schedule has been revised and was issued with addendum No. 2

Question No.	Discipline	Question	Date Received	Response
29	Architectural	Item 32 on the façade elevations calls for patching and repairing of the cracked/damaged cementitious coating and paint finish. Is there an assumed quantity of repair that has been dedicated to this item? I know the actual stucco repair will be a small portion of the actual SF, however do we assume we be re-coating the entire areas?	2/10/2022	Please inclulde a 2500 sqft allowance for the patching and reparing of cementitious coating. Additionally, provide a unit price for any additional area needing repair. Repaired areas to be re-coated to the extent of the nearest adjacent edge or reveal, to be verified in the field with the Architect.
30	General	What are the chances of getting into the building one day next week for an additional site visit? Maybe Thursday the 17th?	2/10/2022	All site visits have to be scheduled with Jill Instasi of Maine's Bureau of General Services. Please coordinate the desired time with Jill so that Museum staff can provide an escort.

00 11 13
Notice to Contractors

Cultural Building Asbestos Abatement & Mechanical Upgrades - Phase 2: Mechanical Upgrades & Museum Abatement PT 3108

The Phase 2 project work consists of asbestos abatement throughout selected areas of the Cultural Building in Augusta, ME, including abatement of asbestos containing materials (ACM) and contaminated materials; and limited removal of the mechanical system components, electrical and fire alarm fixtures and devices, and architectural features to support the abatement work. The work consists of partial renovatoin throughout the entire building, including areas previously abated under separate contract. Upgrades include replacement of the mechanical system, electrical and architectural upgrades necessitated by the abatement and mechanical work, minor structural repairs, and other Work included in the Contract Documents. The work also includes protection of identified exhibits within the Museum galleries to protect the collections and facilitate the abatement and construction activities.

The cost of the work is approximately $ 9,200,000. The work to be performed under this contract shall be completed on or before the Final Completion date of *15 November 2023*.

1. Submit bids on a completed Contractor Bid Form, plus bid security when required, all scanned and included as an attachment to an email with the subject line marked "**Bid for *Cultural Building Asbestos Abatement & Mechanical Upgrades - Phase 2: Mechanical Upgrades and Museum Abatement***" and addressed to the Bid Administrator at: BGS.Architect@Maine.gov, so as to be received no later than **2:00:00 p.m.** on ***February 24, 2022***.

   Bid submissions will be opened and read aloud at the time and date noted above at the Bureau of General Services office, accessible as a video conference call. Those who wish to participate in the call must submit a request for access to Jill.Instasi@Maine.gov.

   Any bid received after the noted time will not be considered a valid bid and will remain unopened. Any bid submitted by any other means will not be considered a valid bid. The Bid Administrator may require the Bidder to surrender a valid paper copy of the bid form or the bid security document in certain circumstances.

   Questions on the bid opening process shall be addressed to the Bid Administrator: Jill Instasi, Bureau of General Services, 77 State House Station, Augusta, Maine 04333-0077, Jill.Instasi@Maine.gov.

2. The bid shall be submitted on the Contractor Bid Form (section 00 41 13) provided in the Bid Documents. The Owner reserves the right to accept or reject any or all bids as may best serve the interest of the Owner.

3. Bid security *is required* on this project.
   If noted above as required, the Bidder shall include a satisfactory Bid Bond (section 00 43 13) or a certified or cashier's check for 5% of the bid amount with the completed bid form submitted to the Owner. The Bid Bond form is available on the BGS website.

4. Performance and Payment Bonds *are required* on this project.
   If noted above as required, the selected Contractor shall furnish a 100% contract Performance Bond (section 00 61 13.13) and a 100% contract Payment Bond (section 00 61 13.16) in the contract amount to cover the execution of the Work. Bond forms are available on the BGS website.

5. Filed Sub-bids *are not required* on this project.

6. There *are no* Pre-qualified General Contractors on this project.
   If Pre-qualified General Contractors are identified for this project, the name of each company, with their city and state, are listed below.

7. An on-site pre-bid conference *will* be conducted for this project.
   If a pre-bid conference is scheduled, it is *mandatory* for General Contractors and optional for Subcontractors and suppliers. Contractors who arrive late or leave early for a mandatory meeting may be prohibited from participating in this meeting and bidding. *Pre-bid conference #1 will be conducted Wednesday, January 19, 2022, at 10:00 a.m. at the Cultural Building, 230 State Street, Augusta, ME 04333. Pre-bid conference #2 will be conducted Tuesday, February 1, 2022, at 9:00 a.m. at the Cultural Building. Those in attendance for conference #1 are not required to attend conference #2. Requests for Information shall be submitted by email to lorrie.picard@woodplc.com by 2:00 PM on February 10, 2022*.

8. Bid Documents - full sets only - will be available on or about *January 14, 2022* and may be obtained *electronically or as printed sets purchased at cost* from:
   Xpress Copy Plan Room
   17 Westfield Street
   Portland, ME 04101
   (207) 775-2444
   https://www.xpressplanroom.com

9. Bid Documents may be examined at:
   AGC Maine
   188 Whitten Road
   Augusta, ME 04330
   Phone 207-622-4741 Fax 207-622-1625

   Construction Summary
   734 Chestnut Street
   Manchester, NH 03104
   Phone 603-627-8856 Fax 603-627-4524

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Construction milestones.
4. Work performed by Owner.
5. Work under Owner's separate contracts.
6. Owner-furnished/Contractor-installed (OFCI) products.
7. Owner-furnished/Owner-installed (OFOI) products.
8. Contractor's use of site and premises.
9. Coordination with occupants.
10. Work restrictions.
11. Specification and Drawing conventions.
12. Miscellaneous provisions.
~~12.~~13. Commissioning.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
2. Section 017300 "Execution" for coordination of Owner-installed products.

1.3 PROJECT INFORMATION

A. Project Identification: Cultural Building Asbestos Abatement and Mechanical Upgrades – Phase 2: Mechanical Upgrades & Museum Abatement.

1. Project Location: 230 State Street, Augusta, Maine.

B. Owner: State of Maine, Bureau of General Services.

1. Owner's Representative: Jill Instasi, State of Maine Bureau of General Services, Sewall Street, 77 SHS, 4th Floor, Augusta, ME 04333 Phone: (207) 624-7341 jill.intasi@maine.gov.
2. BGS Project No. PT 3108.

C. Architect: Wood Environment & Infrastructure Solutions, Inc., 511 Congress Street, Suite 200, Portland, ME 04101 Phone: (207) 775-5401, Fax: (207) 772-4762.

D. Web-Based Project Software: Contractor, may, at their discretion, use project software for purposes of managing communication and documents during the construction stage.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:

1. The Cultural Building houses the State of Maine's three cultural agencies, Maine State Archives, Maine State Museum, and Maine State Library. The facility provides space for storage, maintenance, display, and public access to a large collection of artifacts which tell the story of the State of Maine, as well as administrative office space. The design and construction of upgrades to the Cultural Building are intended to protect occupants and visitors from exposure to hazardous materials, to improve the safety of the collections with appropriate climate control, and it improve the efficiency and functionality of the mechanical systems.

   The Cultural Building is located at 230 State Street, Augusta, Maine. Construction of the five-story building, which is approximately 157,200 total square feet (SF), was completed in 1971. The third floor atrium was added in 1987. Other than minor renovation in administrative offices and building out or changing of the Museum exhibits, minimal renovation has occurred since the original construction.

   The facility is built into a sloped site such that the third floor main entrance at the north atrium is located at grade, with the side sloping down to the south elevation of the Museum and first floor at grade. Exterior walls consist of cast-in-place concrete, precast concrete panels, concrete masonry infill, and glass curtain walls. The exterior is finished with exterior stone cladding in places. The structure is comprised of a steel frame supporting concrete waffle deck and steel form deck. The interior spaces are open to structure in storage areas and have a variety of ceiling systems suspended in the administrative spaces and Museum exhibit galleries.

   The project will provide for partial renovation to the Cultural building including abatement of asbestos containing materials, replacement of the mechanical system, electrical and architectural upgrades necessitated by the abatement and mechanical work, and minor structural repairs. The project also includes protection of identified exhibits within the Museum galleries to protect the collections and facilitate the abatement and construction activities.

   The Museum exhibits remaining in the Cultural Building during construction contain highly sensitive historic collections and require special care while navigating the galleries before protection systems are installed; during construction of protection systems; and for the duration of abatement and construction activities. An exhibit protection work plan, a preinstallation meeting, and integrated mockups are required by other Division 01 Specification Sections prior to construction of exhibit protection. During abatement and construction activities, daily reports are required with photographic documentation through vision panels in protection enclosures. Following abatement activities and receipt

of clearance for each area containing exhibits, exhibit protection enclosures will be unsealed to allow the Owner to enter the enclosures and check on the protected exhibits prior to resealing the enclosures for the duration of remaining construction activities.

B. Type of Contract: Project will be constructed utilizing a single prime contract.

1.5 CONSTRUCTION MILESTONES

A. Construct the Work in accordance with the following schedule:

1. Construction Phase:

a. Commencement of Construction: Work on this phase shall commence within 7 days after Notice to Proceed.
b. Museum Exhibit Protection Punchlist: Following completion of constructing exhibit protection and prior to commencement of abatement activities.
c. Museum Abatement Punchlist: Following completion of abatement activities for a given area and receipt of clearance and prior to resealing exhibit protection enclosures in the respective area for subsequent construction activities.
d. Beneficial Occupancy (Library and Archives): April 1, 2023.~~Substantial Completion: Within 345 days of Commencement of Construction.~~
e. Beneficial Occupancy (Museum): October 1, 2023.
f. Final Completion Date: November 15, 2023.
~~d.~~

2. Commissioning Phase:

a. Commissioning shall be completed prior to beneficial occupancy.~~Commencement of Construction: Work on this phase shall comment upon completion of previous phase.~~
~~b. Substantial Completion: Within 30 days.~~

B. Before commencing Work of each phase, submit an updated copy of Contractor's construction schedule, showing the sequence, commencement and completion dates for all phases of the Work.

1.6 WORK PERFORMED BY OWNER

A. Cooperate fully with Owner, so work may be carried out smoothly, without interfering with or delaying Work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

B. Preceding Work: Owner will perform the following construction operations at Project site. Those operations are scheduled to be substantially complete before Work under this Contract begins.

1. Removal and storage of furniture and equipment from the areas of Work unless otherwise noted on the Drawings or observed during the pre-bid walk in areas identified for Contractor access prior to ~~May 31, 2022~~August 15, 2022. In areas identified for

Contractor access prior to ~~May 31, 2022~~August 15, 2022, furniture and equipment remaining at the time of the pre-bid walk shall be assumed to remain during construction; limited rearrangement or movement of remaining furniture and equipment within the space required to complete the Work shall be coordinated with the Owner.

C. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be conducted simultaneously with Work under this Contract and are planned to be complete by ~~May 30, 2022~~August 14, 2022; completion of those operations is contingent on completion of concurrent work under separate contract at the Center Building, noted in the following section.

1. Removal and storage of furniture, equipment, and collections from the areas of Work identified for Contractor access starting ~~May 31, 2022~~August 15, 2022, unless otherwise noted on the Drawings or specified herein. Furniture, equipment, and collections on the fifth level of the Museum observed during the pre-bid walk shall be assumed to remain during construction; the Owner will move items off perimeter walls to facilitate the Work prior to Contractor access to the space. Limited rearrangement or movement of remaining furniture and equipment within the space required to complete the Work shall be coordinated with the Owner.

1.7 WORK UNDER OWNER'S SEPARATE CONTRACTS

A. Work with Separate Contractors: Cooperate fully with Owner's separate contractors, so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under Owner's separate contracts.

B. Preceding Work: Owner has awarded separate contract(s) for the following construction operations at Project site. Those operations may be substantially complete or may be partially conducted simultaneously with Work under this Contract.

1. Cultural Building Asbestos Abatement and Mechanical Upgrades – Phase 1: To EnviroVantage, Inc. for Work including asbestos abatement, mechanical system demolition, and architectural finish demolition in the Library and Archives sections of the building.

C. Concurrent Work: Owner has awarded separate contract(s) for the following construction operations at the Center Building, AMHI Campus, Hospital Street, Augusta. Those operations will be conducted simultaneously with Work under this Contract and are planned to be substantially complete on ~~March 25, 2022~~June 3, 2022.

1. Center Building Renovation for Temporary Storage: For Work to prepare temporary storage space at the Center Building for the Owner to remove additional Museum collections from the Cultural Building prior to Contractor access to Museum spaces in the Cultural Building.

1.8 OWNER-FURNISHED/CONTRACTOR-INSTALLED (OFCI) PRODUCTS

A. Owner's Responsibilities: Owner will furnish products indicated and perform the following, as applicable:

1. Provide to Contractor Owner-reviewed Product Data.
2. Provide for delivery of Owner-furnished products to Project site.
3. Upon delivery, inspect delivered items.

    a. If Owner-furnished products are damaged, defective, or missing, arrange for replacement.

4. Obtain manufacturer's inspections, service, and warranties.
5. Inform Contractor of earliest available delivery date for Owner-furnished products.

B. Contractor's Responsibilities: The Work includes the following, as applicable:

1. Designate delivery dates of Owner-furnished products in Contractor's construction schedule, utilizing Owner-furnished earliest available delivery dates.
2. Review Owner-reviewed Product Data, noting discrepancies and other issues in providing for Owner-furnished products in the Work.
3. Receive, unload, handle, store, protect, and install Owner-furnished products.
4. Make building services connections for Owner-furnished products.
5. Protect Owner-furnished products from damage during storage, handling, and installation and prior to Substantial Completion.
6. Repair or replace Owner-furnished products damaged following receipt.

C. Owner-Furnished/Contractor-Installed (OFCI) Products:

1. Temporary Wireless Fire Alarm Devices: For use by contractor during construction when a portion(s) of the building fire alarm system is disabled or removed to facilitate the Work.

1.9 OWNER-FURNISHED/OWNER-INSTALLED (OFOI) PRODUCTS

A. The Owner will furnish and install products indicated.

B. Owner-Furnished/Owner-Installed (OFOI) Products:

1. Data Loggers: Owner shall furnish and install a data logger, that measures temperature and humidity, for the Museum spaces and exhibits identified below. Contractor shall provide Owner access to install data loggers following construction of exhibit protection and prior to sealing protection enclosures for abatement. Data loggers shall be installed such that they are visible through viewing ports in the exhibit protection enclosures. Data loggers subject to daily photographic documentation by the Contractor shall be located in the following Museum spaces and exhibits; the Owner may place additional data loggers that require no action from the Contractor:

    a. Cars N Boats Gallery 240, in the space containing exhibits below the protection platform.

b. Exhibit #2.18 (Blacksmith Shop, in Made in Maine Gallery 238), within the exhibit below the sloped ceiling being worked overhead.
c. Exhibit #3.11 (St. Mary Hull, in Lumbering Gallery 390), within the space below the exhibit being worked overhead.
d. Exhibit #3.01 (Mural, in Museum Lobby 373).

2. Temporary Space Heaters: Owner has furnished and installed temporary space heaters throughout the building for the 2021 to 2022 heating season to maintain minimum temperatures of 55 degrees Fahrenheit. Owner will remove temporary space heaters at the completion of the 2021 to 2022 heating season.
3. Portable Dehumidification Units: Owner has furnished and installed portable dehumidification units, connected to building drainable system, throughout the building to maintain relative humidity below 65 percent. Owner will remove portable dehumidification units at the completion of the project.
4. Owner shall provide and install data cabling in Contractor-installed raceways.

1.10 CONTRACTOR'S USE OF SITE AND PREMISES

A. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section. Use of site to be coordinated with Owner's Representative.

B. Limits on Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits on Use of Site: Confine construction operations to work areas as illustrated in the Drawings.
2. Driveways, Walkways and Entrances: Except as shown on the Drawings, keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.11 COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the Museum areas during the initial stages of construction; dates and extents of occupancy and restricted contractor access to those areas are

shown on the Drawings. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
2. Provide signage and barricades at access points to restricted areas occupied by the Owner or outside the limit of Work.
3. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.12 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work to between 7:00 a.m. to 6:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.

1. Weekend and Holiday Hours: As coordinated with the Owner.
2. Hours for Utility Shutdowns: As coordinated with the Owner.
3. Hours for Operations Creating Loud Noise Levels: 8:00 a.m. and 5:00 pm.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Owner's property is not permitted.

E. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

F. Employee Screening: Comply with Owner’s requirements for background screening of Contractor personnel working on Project site. Require personnel to use identification tags at all times. Utilize the Background Check Application attached to this section. State requirements forbid people with felony convictions from working on this project.

1.13 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.

C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.
3. Keynoting: Materials and products may be identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Instruction in operation and maintenance of systems, subsystems, and equipment.
2. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Qualification Data: For facilitator or instructor.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.
b. Name and address of videographer.
c. Name of Architect.

d. Name of Construction Manager.
e. Name of Contractor.
f. Date of video recording.

2. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
3. At completion of training, submit complete training manual(s) for Owner's use prepared in same paper and PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

D. ~~Preinstruction Conference:~~ Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." ~~Review methods and procedures related to demonstration and training including, but not limited to, the following:~~

~~1. Inspect and discuss locations and other facilities required for instruction.~~
~~2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.~~
~~3. Review required content of instruction.~~
~~4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.~~

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.7 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   h. Performance curves.

2. Documentation: Review the following items in detail:

   a. Emergency manuals.
   b. Systems and equipment operation manuals.
   c. Systems and equipment maintenance manuals.
   d. Product maintenance manuals.
   e. Project Record Documents.
   f. Identification systems.
   g. Warranties and bonds.
   h. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.

h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning.
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

1.8 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

1.9 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

1.10 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD modewith vibration reduction technology.

1. Submit video recordings on CD-ROM or thumb drive.
2. File Hierarchy: Organize folder structure and file locations according to Project Manual table of contents. Provide complete screen-based menu.
3. File Names: Utilize file names based on name of equipment generally described in video segment, as identified in Project specifications.
4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the equipment demonstration and training recording that describes the following for each Contractor involved on the Project, arranged according to Project Manual table of contents:

a. Name of Contractor/Installer.
b. Business address.
c. Business phone number.
d. Point of contact.
e. Email address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

1. Film training session(s) in segments not to exceed 15 minutes.

a. Produce segments to present a single significant piece of equipment per segment.
b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. General requirements for coordinating and scheduling commissioning activities.
2. Commissioning meetings.
3. Commissioning reports.
4. Use of commissioning process test equipment, instrumentation, and tools.
5. Construction checklists, including, but not limited to, installation checks, startup, performance tests, and performance test demonstration.
6. Commissioning tests and commissioning test demonstration.
7. Adjusting, verifying, and documenting identified systems and assemblies.

B. Related Requirements:

1. Section 011000 "Summary" for Commissioning Authority responsibilities.
2. Section 013300 "Submittal Procedures" for submittal procedure requirements for commissioning process.
3. Section 017700 "Closeout Procedures" for Certificate of Construction-Phase Commissioning Process Completion submittal requirements.
4. Section 017823 "Operation and Maintenance Data" for preliminary operation and maintenance data submittal requirements.
5. Section 230800 "Commissioning of HVAC" for technical commissioning requirements for HVAC.

1.3 DEFINITIONS

A. Acceptance Criteria: Threshold of acceptable work quality or performance specified for a commissioning activity, including, but not limited to, construction checklists, performance tests, performance test demonstrations, commissioning tests, and commissioning test demonstrations.

B. Basis-of-Design Document: A document prepared by Architect that records concepts, calculations, decisions, and product selections used to comply with Owner's Project Requirements and to suit applicable regulatory requirements, standards, and guidelines.

C. Commissioning Authority: An independent testing agency hired by the Contractor~~An entity engaged by Owner~~, and identified in Section 011000 "Summary," to evaluate Commissioning-Process Work.

D. Commissioning Plan: A document, prepared by Commissioning Authority, that outlines the organization, schedule, allocation of resources, and documentation of commissioning requirements.

E. Commissioning: A quality-focused process for verifying and documenting that the facility and its systems and assemblies are installed, and tested to comply with Owner's Project Requirements. The requirements specified here are limited to the construction phase commissioning activities.

F. Construction-Phase Commissioning-Process Completion: The stage of completion and acceptance of commissioning process when resolution of deficient conditions and issues discovered during commissioning process and retesting until acceptable results are obtained has been accomplished. ~~Owner~~ Commissioning Authority will establish in writing the date construction-phase commissioning-process completion is achieved. See Section 017700 "Closeout Procedures" for Certificate of Construction-Phase Commissioning Process Completion submittal requirements.

1. Commissioning process is complete when the Work specified of this Section and related Sections has been completed and accepted, including, but not limited to, the following:

a. Completion of tests and acceptance of test results.
b. Resolution of issues, as verified by retests performed and documented with acceptance of retest results.
c. Comply with requirements in Section 017900 "Demonstration and Training."
d. Completion and acceptance of submittals and reports.

G. Owner's Project Requirements: A document that details the functional requirements of a project and the expectations of how it will be used and operated, including Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information. This document is prepared either by the Owner or for the Owner by the Architect or Commissioning Authority.

H. Owner's Witness: Commissioning Authority, Owner's Project Manager, or Architect-designated witness authorized to authenticate test demonstration data and to sign completed test data forms.

I. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.

J. Test: Performance tests, performance test demonstrations, commissioning tests, and commissioning test demonstrations.

1.4 COMPENSATION

A. If Architect or Engineer, Commissioning Authority, other Owner's witness, or Owner's staff perform additional services or incur additional expenses due to actions of Contractor listed below, Contractor shall compensate Owner for such additional services and expenses.

1. Failure to provide timely notice of commissioning activities schedule changes.
2. Failure to meet acceptance criteria for test demonstrations.

1.5 COMMISSIONING TEAM

A. Members Appointed by Contractor(s):

1. Commissioning Coordinator: A person or entity employed by Contractor to manage, schedule, and coordinate commissioning process.
2. Project superintendent and other employees that Contractor may deem appropriate for a particular portion of the commissioning process.
3. Subcontractors, installers, suppliers, and specialists that Contractor may deem appropriate for a particular portion of the commissioning process.
4. Appointed team members shall have the authority to act on behalf of the entity they represent.

B. Commissioning Agency Members Hired by Contractor:

1. Commissioning Authority, plus consultants that Commissioning Authority may deem appropriate for a particular portion of the commissioning process.

C. Members Appointed by Owner:

~~1. Commissioning Authority, plus consultants that Commissioning Authority may deem appropriate for a particular portion of the commissioning process.~~

1. Owner representative(s), facility operations and maintenance personnel, plus other employees, separate contractors, and consultants that Owner may deem appropriate for a particular portion of the commissioning process.
2. Engineer, plus employees and consultants that Architect may deem appropriate for a particular portion of the commissioning process.

1.6 INFORMATIONAL SUBMITTALS

A. Comply with requirements in Section 013300 "Submittal Procedures" for submittal procedure general requirements for commissioning process.

B. Commissioning Plan Information:

1. List of ~~Contractor-appointed~~Commissioning Authority commissioning team members to include specific personnel and subcontractors performing the various commissioning requirements.
2. Schedule of commissioning activities, integrated with the Construction Schedule. Comply with requirements in Section 013200 "Construction Progress Documentation" for the Construction Schedule general requirements for commissioning process.
3. Contractor personnel and subcontractors participating in each test.
4. List of instrumentation required for each test to include identification of parties that will provide instrumentation for each test.

C. Commissioning schedule.

D. Two-week look-ahead schedules.

E. Commissioning Coordinator Letter of Authority:

1. Within 10 days after approval of Commissioning Coordinator qualifications, submit a letter of authority for Commissioning Coordinator, signed by a principal of Contractor's firm. Letter shall authorize Commissioning Coordinator to do the following:

    a. Make inspections required for commissioning process.
    b. Coordinate, schedule, and manage commissioning process of Contractor, subcontractors, and suppliers.
    c. Obtain documentation required for commissioning process from Contractor, subcontractors, and suppliers.
    d. Report issues, delayed resolution of issues, schedule conflicts, and lack of cooperation or expertise on the part of members of the commissioning team.

F. List test instrumentation, equipment, and monitoring devices. Include the following information:

1. Make, model, serial number, and application for each instrument, equipment, and monitoring device.
2. Brief description of intended use.
3. Calibration record showing the following:

    a. Calibration agency, including name and contact information.
    b. Last date of calibration.
    c. Range of values for which calibration is valid.
    d. Certification of accuracy.
    e. Certification for calibration equipment traceable to NIST.
    f. Due date of the next calibration.

G. Test Reports:

1. Pre-Startup Report: Prior to startup of equipment or a system, submit signed, completed construction checklists.
2. Test Data Reports: At the end of each week in which tests are conducted, submit test data for tests performed.
3. Commissioning Issue Reports: Daily, at the end of each week in which tests are conducted, submit commissioning issue reports for tests for which acceptable results were not achieved.
4. Weekly Progress Report: Weekly, at the end of each week in which tests are conducted, submit a progress report.
5. Data Trend Logs: Submit data trend logs at the end of the trend log period.
6. System Alarm Logs: Weekly, at the start of days following a day in which tests were performed, submit printout of log of alarms that occurred since the last log was printed.

H. Construction Checklists:

1. Material checks.
2. Installation checks.
3. Startup procedure~~s~~ test reports, where required.

1.7 CLOSEOUT SUBMITTALS

A. Commissioning Report:

1. At Construction-Phase Commissioning Completion, include the following:

a. Pre-startup reports.
b. Approved test procedures.
c. Test data forms, completed and signed.
d. Progress reports.
e. Commissioning issue report log.
f. Commissioning issue reports showing resolution of issues.
g. Correspondence or other documents related to resolution of issues.
h. Other reports required by commissioning process.
i. List unresolved issues and reasons they remain unresolved and should be exempted from the requirements for Construction-Phase Commissioning Completion.
j. Report shall include commissioning work of Contractor.

B. Request for Certificate of Construction-Phase Commissioning Process Completion.

C. Operation and Maintenance Data: For proprietary test equipment, instrumentation, and tools to include in operation and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Commissioning Coordinator Qualifications:

1. Documented experience commissioning systems of similar complexity to those contained in these documents on other projects of similar scope and complexity.
2. Certification of commissioning-process expertise. The following certifications are acceptable. Owner reserves the right to accept or reject certifications as evidence of qualification.

a. Certified Commissioning Authority, by AABC Commissioning Group (ACG).
b. Commissioning-Process Management Professional, by American Society of Heating, Refrigerating and Air-Conditioning Engineers.
c. Certified Commissioning Professional, by Building Commissioning Association.

B. Calibration Agency Qualifications: Certified by The American Association for Laboratory Accreditation that the calibration agency complies with minimum requirements of ISO/IEC 17025.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT, INSTRUMENTATION, AND TOOLS

A. Test equipment and instrumentation required to perform the commissioning process shall remain the property of Contractor unless otherwise indicated.

B. Test equipment and instrumentation required to perform commissioning process shall comply with the following criteria:

1. Be manufactured for the purpose of testing and measuring tests for which they are being used and have an accuracy to test and measure system performance within the tolerances required to determine acceptable performance.
2. Calibrated and certified.

    a. Calibration performed and documented by a qualified calibration agency according to national standards applicable to the tools and instrumentation being calibrated. Calibration shall be current according to national standards or within test equipment and instrumentation manufacturer's recommended intervals, whichever is more frequent, but not less than within six months of initial use on Project. Calibration tags shall be permanently affixed.
    b. Repair and recalibrate test equipment and instrumentation if dismantled, dropped, or damaged since last calibrated.

3. Maintain test equipment and instrumentation.
4. Use test equipment and instrumentation only for testing or monitoring Work for which they are designed.

2.2 PROPRIETARY TEST EQUIPMENT, INSTRUMENTATION, AND TOOLS

A. Proprietary test equipment, instrumentation, and tools are those manufactured or prescribed by tested equipment manufacturer and required for work on its equipment as a condition of equipment warranty, or as otherwise required to service, repair, adjust, calibrate, or perform work on its equipment.

1. Identify proprietary test equipment, instrumentation, and tools required in the test equipment identification list submittal.
2. Proprietary test equipment, instrumentation, and tools shall become the property of Owner at Substantial Completion.

2.3 REPORT FORMAT AND ORGANIZATION

A. General Format and Organization:

1. Bind report in three-ring binders.
2. Label the front cover and spine of each binder with the report title, volume number, project name, Contractor's name, and date of report.
3. Record report on compact disk or USB thumb drive.
4. Electronic Data: Portable document format (PDF); a single file with outline-organized bookmarks for major and minor tabs and tab contents itemized for specific reports.

B. Commissioning Report:

1. Include a table of contents and an index to each test.
2. Include major tabs for each Specification Section.
3. Include minor tabs for each test.

4. Within each minor tab, include the following:

    a. Test specification.
    b. Pre-startup reports.
    c. Approved test procedures.
    d. Test data forms, completed and signed.
    e. Commissioning issue reports, showing resolution of issues, and documentation related to resolution of issues pertaining to a single test. Group data forms, commissioning issue reports showing resolution of issues, and documentation related to resolution of issues for each test repetition together within the minor tab, in reverse chronological order (most recent on top).

PART 3 - EXECUTION

3.1 PREPARATION

A. Review preliminary construction checklists and preliminary test procedures and data forms.

3.2 CONSTRUCTION CHECKLISTS

A. Construction checklists cannot modify or conflict with the Contract Documents.

B. Create construction checklists based on actual systems and equipment to be included in Project.

C. Material Checks: Compare specified characteristics and approved submittals with materials as received. Include factory tests and other evaluations, adjustments, and tests performed prior to shipment if applicable.

1. Service connection requirements, including configuration, size, location, and other pertinent characteristics.
2. Included optional features.
3. Installation Checks:

    a. Location according to Drawings and approved Shop Drawings.
    b. Configuration.
    c. Compliance with manufacturers' written installation instructions.
    d. Attachment to structure.
    e. Access clearance to allow for maintenance, service, repair, removal, and replacement without the need to disassemble or remove other equipment or building elements. Access coordinated with other building elements and equipment, including, but not limited to, ceiling and wall access panels, in a manner consistent with OSHA fall-protection regulations and safe work practices.
    f. Utility connections are of the correct characteristics, as applicable.
    g. Correct labeling and identification.
    h. Startup Checks: Verify readiness of equipment to be energized. Include manufacturer's standard startup procedures and forms.

D. Startup: Perform and document initial operation of equipment to prove that it is installed properly and operates as intended according to manufacturer's standard startup procedures, at minimum.

E. Performance Tests:

1. Functional Performance Tests (FPT): Test and evaluate performance of systems under a full range of operating conditions and loads.

3.3 GENERAL EXECUTION REQUIREMENTS

A. Schedule and coordinate the commissioning process with the Construction Schedule.

B. Perform activities identified in construction checklists, including tests, and document results of actions as construction proceeds.

C. Perform test demonstrations for Owner's witness. Unless otherwise indicated, demonstrate tests for 100 percent of work to which the test applies.

D. Report test data and commissioning issue resolutions.

E. Schedule personnel to participate in and perform Commissioning-Process Work.

F. Installing contractors' commissioning responsibilities include, but are not limited to, the following:

1. Operating the equipment and systems ~~they install~~ during functional tests.
2. In addition, installing contractors may be required to assist in tests of equipment and systems with which their work interfaces.

3.4 COMMISSIONING COORDINATOR RESPONSIBILITIES

A. Management and Coordination: Manage, schedule, and coordinate commissioning process, including, but not limited to, the following:

1. Coordinate with subcontractors on their commissioning responsibilities and activities.
~~2. Obtain, assemble, and submit commissioning documentation.~~
~~3.~~2. Attend periodic on-site commissioning meetings. Comply with requirements in Section 013100 "Project Management and Coordination."
~~4.~~3. ~~Develop and maintain the commissioning schedule.~~ Integrate commissioning schedule into the Construction Schedule. Update Construction Schedule at specified intervals.
~~5. Review and comment on preliminary test procedures and data forms.~~
~~6. Report inconsistencies and issues in system operations.~~
~~7.~~4. Verify that equipment startup tests have been successfully completed ~~and results comply with acceptance criteria,~~ and that equipment and systems are ready before scheduling test demonstrations.
~~8. Direct and coordinate test demonstrations.~~
~~9.~~5. Coordinate witnessing of test demonstrations by Owner's witness.

~~10. Coordinate and manage training. Be present during training sessions to direct video recording, present training, and direct the training presentations of others. Comply with requirements in Section 017900 "Demonstration and Training."~~
~~11. Prepare and submit specified commissioning reports.~~
~~12. Track commissioning issues until resolution and retesting is successfully completed.~~
~~13. Retain original records of Commissioning Process Work, organized as required for the commissioning report. Provide Owner's representative access to these records on request.~~
~~14. Assemble and submit commissioning report.~~

3.5 COMMISSIONING AUTHORITY RESPONSIBILITIES

A. Lead and perform the commissioning process, including, but not limited to:

1. Obtain, assemble, and submit commissioning documentation.
2. Schedule and lead periodic on-site commissioning meetings. Comply with requirements in Section 013100 “Project Management and Coordination.”
3. Develop and maintain the Commissioning Schedule. Coordinate Commissioning Schedule into the Construction Schedule with the Contractor and the Owner. Update the Commissioning Schedule as required – at least monthly.
4. Review and comment on preliminary test procedures and data forms submitted by the Contractor.
5. Report inconsistencies and issues in system operations.
6. Direct and coordinate test demonstrations.
7. Coordinate witnessing of test demonstrations by Owner’s witness.
8. Track commissioning issues until resolution and retesting is successfully completed.
9. Retain original records of Commissioning-Process Work, organized as required for the commissioning report. Provide Owner’s Representative access to these records on request.
10. Assemble and submit commissioning report.

~~3.5~~3.6 COMMISSIONING FUNCTIONAL TESTING

A. Quality Control: Construction checklists, including tests, are quality-control tools designed to improve the functional quality of Project. Test demonstrations evaluate the effectiveness of Contractor's quality-control process.

B. ~~Owner's witness will be present to witness commissioning work requiring the signature of an owner's witness, including, but not limited to, test demonstrations.~~ Owner's project manager will coordinate attendance by Owner's witness with Contractor's published Commissioning Schedule. Owner's witness will provide no labor or materials in the commissioning work. The only functions of Owner's witness will be to observe and comment on the progress and results of commissioning process and sign any commissioning forms requiring the signature of an Owner’s witness.

C. Construction Checklists (Pre-Functional Test Checklists):

1. Complete construction checklists as Work is completed.
2. Distribute construction checklists to installing contractors before they start work.
3. Installers:

a. Verify installation using approved construction checklists as Work proceeds.
b. Complete and sign construction checklists weekly for work performed during the preceding week.

4. Provide Commissioning Authority access to completed construction checklists.

D. Installation Compliance Issues: Record as an installation compliance issue Work found to be incomplete, inaccessible, at variance with the Contract Documents, nonfunctional, or that does not comply with construction checklists. Record installation compliance issues on the construction checklist at the time they are identified. Record corrective action and how future Work should be modified before signing off the construction checklist.

~~E. Pre-Startup Audit: Prior to executing startup procedures, review completed installation checks to determine readiness for startup and operation. Report conditions, which, if left uncorrected, adversely impact the ability of systems or equipment to operate satisfactorily or to comply with acceptance criteria. Prepare pre-startup report for each system.~~

~~F.~~E. Functional Test Procedures and Test Data Forms:

1. Test procedures shall define the step-by-step procedures to be used to execute tests and test demonstrations.
2. Test procedures shall be specific to the make, model, and application of the equipment and systems being tested.
3. Completed test data forms are the official records of the test results.
4. Commissioning Authority will provide to Contractor preliminary test procedures and test data forms for performance tests and commissioning tests after approval of Product Data, Shop Drawings, and preliminary operation and maintenance manual.
5. Review preliminary test procedures and test data forms, and provide comments within 14 days of receipt from Commissioning Authority. Review shall address the following:

   a. Equipment protection and warranty issues, including, but not limited to, manufacturers' installation and startup recommendations, and operation and maintenance instructions.
   b. Applicability of the procedure to the specific software, equipment, and systems approved for installation.

6. After Contractor has reviewed and commented on the preliminary test procedures and test data forms, Commissioning Authority will revise and reissue the approved revised test procedures and test data forms marked "Approved for Testing."
7. Use only approved test procedures and test data forms marked "Approved for Testing" to perform and document tests and test demonstrations.

~~G.~~F. Performance of Functional Tests:

1. Perform Functional Testing of all HVAC equipment unless otherwise indicated.
2. Notify Owner's witness at least three days in advance of each functional test.

   a. Failure of Owner's witness to be present for agreed-on schedule of test demonstration shall not delay Contractor. If Owner's witness fails to attend a scheduled test, Contractor shall proceed with the scheduled test.

3. Perform and complete each step of the approved test procedures in the order listed.
4. Record data observed during performance of tests on approved data forms at the time of test performance and when the results are observed.
5. Record test results that are not within the range of acceptable results on commissioning issue report forms in addition to recording the results on approved test procedures and data forms according to the "Commissioning Compliance Issues" Paragraph in this Article.
6. On completion of a test, sign the completed test procedure and data form. Tests for which test procedures and data forms are incomplete, not signed, or which indicate performance that does not comply with acceptance criteria will be rejected. Tests for which test procedures and data forms are rejected shall be repeated and results resubmitted.
7. False load test requirements are specified in related sections.

    a. Where false load testing is specified, provide temporary equipment, power, controls, wiring, piping, valves, and other necessary equipment and connections required to apply the specified load to the system. False load system shall be capable of steady-state operation and modulation at the level of load specified. Equipment and systems permanently installed in this work may be used to create the temporary false load using control overrides, schedule adjustments, or setpoint adjustments as long as the systems and equipment are not damaged or degraded and space temperature and humidity are not adversely affected. After the test is complete, the overrides shall be removed and the systems shall revert to normal operation.

~~H.~~G. Deferred Tests:

1. Deferred Test List: Identify proposed deferred tests or other tests approved for deferral until specified seasonal or other conditions are available. When approved, deferred tests may be completed after the date of Construction-Phase Commissioning Completion. Identify proposed deferred tests as follows:

    a. Identify deferred tests by number and title.
    b. Provide a target schedule for completion of deferred tests.

2. Schedule and coordinate deferred tests. Schedule deferred tests when specified conditions are available. ~~Notify Architect and Commissioning Authority at least three working days (minimum) in advance of tests.~~
3. Where deferred tests are specified, coordinate participation of necessary personnel and of Architect, Commissioning Authority, and Owner's witness. Schedule deferred tests to minimize occupant and facility impact. ~~Obtain Architect's approval of the proposed schedule.~~

~~I.~~H. Delayed Tests:

1. Delayed Test List: Identify proposed delayed tests. Obtain Owner approval of proposed delayed tests, including proposed schedule of completion of each delayed test, before submitting request for Certificate of Construction-Phase Commissioning Process Completion. Include the following in the request for Certificate of Construction-Phase Commissioning Process Completion:

    a. Identify delayed tests by test number and title.

b. Written approval of proposed delayed tests, including approved schedule of completion of delayed tests.

2. Schedule and coordinate delayed tests. Schedule delayed tests when conditions that caused the delay have been rectified. ~~Notify Architect and Commissioning Authority at least three working days (minimum) in advance of tests.~~
3. Where delayed tests are approved, coordinate participation of necessary personnel and of Architect, Commissioning Authority, and Owner's witness. Schedule delayed tests to minimize occupant and facility impact. ~~Obtain Architect's approval of the proposed schedule.~~

~~J.~~I. Commissioning Compliance Issues:

1. Test results that are not within the range of acceptable results are commissioning compliance issues.
2. Track and report commissioning compliance issues until resolution and retesting are successfully completed.
3. If a test demonstration fails, determine the cause of failure. Direct timely resolution of issue and then repeat the demonstration. If the issue can be quickly corrected (such as changing a setpoint, tuning a control loop, etc.) then the Contractor shall immediately make the correction and the test shall be repeated until proper operation is verified.~~If a test demonstration must be repeated due to failure caused by Contractor work or materials, reimburse Owner for billed costs for the participation in the repeated demonstration.~~
4. Test Results: If a test demonstration fails to meet the acceptance criteria and cannot be immediately corrected, perform the following:

   a. Complete a commissioning compliance issue report form promptly on discovery of test results that do not comply with acceptance criteria.
   b. Submit commissioning compliance issue report form within 24 hours of the test.
   c. Determine the cause of the failure.
   d. Establish responsibility for corrective action if the failure is due to conditions found to be Contractor's responsibility.

5. Commissioning Compliance Issue Report: Provide a commissioning compliance issue report for each issue. Do not report multiple issues on the same commissioning compliance issue report.

   a. Exception: If an entire class of devices is determined to exhibit the identical issue, they may be reported on a single commissioning compliance issue report. (For example, if all return-air damper actuators that are specified to fail to the open position are found to fail to the closed position, they may be reported on a single commissioning issue report. If a single commissioning issue report is used for multiple commissioning compliance issues, each device shall be identified in the report, and the total number of devices at issue shall be identified.
   b. Complete and submit Part 1 of the commissioning compliance issue report immediately when the condition is observed.
   c. Record the commissioning compliance issue report number and describe the deficient condition on the data form.
   d. Resolve commissioning compliance issues promptly. Complete and submit Part 2 of the commissioning compliance issue report when issues are resolved.

6. Diagnose and correct failed test demonstrations as follows:

    a. Perform diagnostic tests and activities required to determine the fundamental cause of issues observed.
    b. Record each step of the diagnostic procedure prior to performing the procedure. Update written procedure as changes become necessary.
    c. Record the results of each step of the diagnostic procedure.
    d. Record the conclusion of the diagnostic procedure on the fundamental cause of the issue.
    e. Determine and record corrective measures.
    f. Include diagnosis of fundamental cause of issues in commissioning compliance issue report.

7. Retest:

    a. Schedule and repeat the complete test procedure for each test demonstration for which acceptable results are not achieved. Obtain signature of Owner's witness on retest data forms. Repeat test demonstration until acceptable results are achieved. Except for issues that are determined to result from design errors or omissions, or other conditions beyond Contractor's responsibility, compensate Owner for direct costs incurred as the result of repeated test demonstrations to achieve acceptable results.
    b. For each repeated test demonstration, submit a new test data form, marked "Retest."

8. Do not correct commissioning compliance issues during test demonstrations.

    a. Exceptions will be allowed if the cause of the issue is obvious and resolution can be completed in less than five minutes. If corrections are made under this exception, note the deficient conditions on the test data form and issue a commissioning compliance issue report. A new test data form, marked "Retest," shall be initiated after the resolution has been completed.

~~3.6~~3.7 COMMISSIONING MEETINGS

A. Commissioning Authority will schedule and conduct commissioning meetings. Comply with requirements in Section 013100 "Project Management and Coordination."

~~3.7~~3.8 SEQUENCING

A. Sequencing of Commissioning Verification Activities: For a particular material, item of equipment, assembly, or system, perform the following in the order listed unless otherwise indicated:

1. Construction Checklists:

    a. Material checks.
    b. Installation checks.

~~c. Startup, as appropriate. Some startup may depend on component performance. Such startup may follow component performance tests on which the startup depends.~~

~~d.~~c. Performance Tests:

1) Static tests, as appropriate.
2) Component performance tests. Some component performance tests may depend on completion of startup. Such component performance tests may follow startup.
3) Equipment and assembly performance tests.
4) System performance tests.
5) Intersystem performance tests.

2. Commissioning tests.

B. Before performing commissioning tests, verify that materials, equipment, assemblies, and systems are delivered, installed, started, and adjusted to perform according to construction checklists.

C. Verify readiness of materials, equipment, assemblies, and systems by performing tests prior to performing test demonstrations. Notify Architect if acceptable results cannot be achieved due to conditions beyond Contractor's control or responsibility.

D. Commence tests as soon as installation checks for materials, equipment, assemblies, or systems are satisfactorily completed. Tests of a particular system may proceed prior to completion of other systems, provided the incomplete work does not interfere with successful execution of test.

~~3.8~~3.9 SCHEDULING

A. Commence commissioning process as early in the construction period as possible.

B. Commissioning Schedule: Integrate commissioning activities into Construction Schedule. See Section 013200 "Construction Progress Documentation."

1. Include detailed commissioning activities in monthly updated Construction Schedule and short-interval schedule submittals.
2. Schedule the start date and duration for the following commissioning activities:

a. Submittals.
b. Preliminary operation and maintenance manual submittals.
c. Installation checks.
d. Startup, where required.
e. Performance tests.
f. Performance test demonstrations.
g. Commissioning tests.
h. Commissioning test demonstrations.

3. Schedule shall include a line item for each installation check, startup, and test activity specific to the equipment or systems involved.

4. Determine milestones and prerequisites for commissioning process. Show commissioning milestones, prerequisites, and dependencies in monthly updated critical-path-method construction schedule and short-interval schedule submittals.

C. Two-Week Look-Ahead Commissioning Schedule:

1. Two weeks prior to the beginning of tests, submit a detailed two-week look-ahead schedule. Thereafter, submit updated two-week look-ahead schedules weekly for the duration of commissioning process.
2. Two-week look-ahead schedules shall identify the date, time, beginning location, Contractor personnel required, and anticipated duration for each startup or test activity.
3. Use two-week look-ahead schedules to notify and coordinate participation of Owner's witnesses.

D. Owner's Witness Coordination:

1. Coordinate Owner's witness participation via Architect.
2. Notify Architect of commissioning schedule changes at least ~~[two]~~ ~~<Insert number>~~five work days in advance for activities requiring the participation of Owner's witness.

~~3.9~~3.10 COMMISSIONING REPORTS

A. Test Reports:

1. Pre-startup reports include observations of the conditions of installation, organized into the following sections:

a. Equipment Model Verification: Compare contract requirements, approved submittals, and provided equipment. Note inconsistencies.
b. Preinstallation Physical Condition Checks: Observe physical condition of equipment prior to installation. Note conditions including, but not limited to, physical damage, corrosion, water damage, or other contamination or dirt.
c. Preinstallation Component Verification Checks: Verify components supplied with the equipment, preinstalled or field installed, are correctly installed and functional. Verify external components required for proper operation of equipment correctly installed and functional. Note missing, improperly configured, improperly installed, or nonfunctional components.
d. Summary of Installation Compliance Issues and Corrective Actions: Identify installation compliance issues and the corrective actions for each. Verify that issues noted have been corrected.
e. Evaluation of System Readiness for Startup: For each item of equipment for each system for which startup is anticipated, document in summary form acceptable to Owner completion of equipment model verification, preinstallation physical condition checks, preinstallation component verification checks, and completion of corrective actions for installation compliance issues.

2. Test data reports include the following:

a. "As-tested" system configuration. Complete record of conditions under which the test was performed, including, but not limited to, the status of equipment, systems, and assemblies; temporary adjustments and settings; and ambient conditions.
b. Data and observations, including, but not limited to, data trend logs, recorded during the tests.
c. Signatures of individuals performing and witnessing tests.
d. Data trend logs accumulated overnight from the previous day of testing.

3. Commissioning Compliance Issue Reports: Report as commissioning compliance issues results of tests and test demonstrations that do not comply with acceptance criteria. Report only one issue per commissioning compliance issue report. Use sequentially numbered facsimiles of commissioning compliance issue report form included in this Section, or other form approved by Owner. Distribute commissioning compliance issue reports to parties responsible for taking corrective action. Identify the following:

a. Commissioning compliance issue report number. Assign unique, sequential numbers to individual commissioning compliance issue reports when they are created, to be used for tracking.
b. Action distribution list.
c. Report date.
d. Test number and description.
e. Equipment identification and location.
f. Briefly describe observations about the performance associated with failure to achieve acceptable results. Identify the cause of failure if apparent.
g. Diagnostic procedure or plan to determine the cause (include in initial submittal)
h. Diagnosis of fundamental cause of issues as specified below (include in resubmittal).
i. Fundamental cause of unacceptable performance as determined by diagnostic tests and activities.
j. When issues have been resolved, update and resubmit the commissioning issue report forms by completing Part 2. Identify resolution taken and the dates and initials of the persons making the entries.
k. Schedule for retesting.

4. Weekly progress reports include information for tests conducted since the preceding report and the following:

a. Completed data forms.
b. Equipment or system tested, including test number, system or equipment tag number and location, and notation about the apparent acceptability of results.
c. Activities scheduled but not conducted per schedule.
d. Commissioning compliance issue report log.
e. Schedule changes for remaining Commissioning-Process Work, if any.

5. Data trend logs shall be initiated and running prior to the time scheduled for the test demonstration.

a. Trend log data format shall be multiple data series graphs. Where multiple data series are trend logged concurrently, present the data on a common horizontal time axis. Individual data series may be presented on a segmented vertical axis to avoid interference of one data series with another, and to accommodate different axis

scale values. Graphs shall be sufficiently clear to interpret data within the accuracy required by the acceptance criteria.

b. Attach to the data form printed trend log data collected during the test or test demonstration.

c. Record, print out, and attach to the data form operator activity during the time the trend log is running. During the time the trend log is running, operator intervention not directed by the test procedure invalidates the test results.

6. System Alarm Logs: Record and print out a log of alarms that occurred since the last log was printed. Evaluate alarms to determine if the previous day's work resulted in any conditions that are not considered "normal operation."

a. Conditions that are not considered "normal operation" shall be reported on a commissioning issue report attached to the alarm log. Resolve as necessary. The intent of this requirement is to discover control system points or sequences left in manual or disabled conditions, equipment left disconnected, set points left with abnormal values, or similar conditions that may have resulted from failure to fully restore systems to normal, automatic control after test completion.

~~3.10~~3.11 CERTIFICATE OF CONSTRUCTION-PHASE COMMISSIONING PROCESS COMPLETION

A. When Contractor considers that construction-phase commissioning process, or a portion thereof which Owner agrees to accept separately, is complete, Contractor shall prepare and submit to Owner and Commissioning Authority through Architect a comprehensive list of items to be completed or corrected. Failure to include an item on such list does not alter Contractor's responsibility to compete commissioning process.

B. On receipt of Contractor's list, Commissioning Authority will make an inspection to determine whether the construction-phase commissioning process or designated portion thereof is complete. If Commissioning Authority's inspection discloses items, whether included on Contractor's list, which is not sufficiently complete as defined in "Construction-Phase Commissioning Process Completion" Paragraph in the "Definitions" Article, Contractor shall, before issuance of the Certificate of Construction-Phase Commissioning Process Completion, complete or correct such items on notification by Commissioning Authority. In such case, Contractor shall then submit a request for another inspection by Commissioning Authority to determine construction-phase commissioning process completion.

C. Contractor shall promptly correct deficient conditions and issues discovered during commissioning process. Costs of correcting such deficient conditions and issues, including additional testing and inspections, the cost of uncovering and replacement, and compensation for Architect's and Commissioning Authority's services and expenses made necessary thereby, shall be at Contractor's expense.

D. When construction-phase commissioning process or designated portion is complete, Commissioning Authority will prepare a Certificate of Construction-Phase Commissioning Process Completion that shall establish the date of completion of construction-phase commissioning process. Certificate of Construction-Phase Commissioning Process Completion shall be submitted prior to requesting inspection for determining date of Substantial Completion.

END OF SECTION 019113

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 017300 "Execution" for cutting and patching procedures.
3. Section 013516 "Alteration Project Procedures" for general protection and work procedures for alteration projects.
4. Section 022600 “Asbestos Abatement.”

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

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

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site and/or online.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.5 INFORMATIONAL SUBMITTALS

A. Submittals shall comply with the requirements of Section 013300 “Submittal Procedures” and the individual sections specifying the work.

B. Submit fire alarm drawings indicating wiring runs between all devices shown on the construction plans. Plans will be used by contractor during the new work phase to re-install devices removed and salvaged during Phase 1 and Phase 2 demolition and reconnect them to the existing loops, providing new conduit and wiring where existing was removed during Phase 1 and Phase 2 demolition~~install new devices and reconnect them to the existing loops~~. Submitted plans must be approved prior to any fire alarm device, conduit, or wiring being removed.

C. Qualification Data: For refrigerant recovery technician.

D. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

E. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

F. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.

G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

H. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.6 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.7 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.8 FIELD CONDITIONS

A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.

D. Storage or sale of removed items or materials on-site is not permitted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

B. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

C. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

D. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs or video.

1. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off utilities with utility companies and Owner's representative.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 1/2 hour after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable,

protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

E. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.

1. Remove existing roof membrane, flashings, copings, and roof accessories.
2. Remove existing roofing system down to substrate.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction. and recycle or dispose of them according to applicable laws and regulations.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

3.8 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 230800 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes Cx process requirements for the following HVAC systems, assemblies, and equipment:

1. Heat generation systems.
2. Cooling generation systems.
3. Central-station air-handling systems.
4. Air, steam, and hydronic distribution systems.
5. Heating and cooling terminal and unitary equipment.
6. HVAC controls.
7. TAB verification.

B. Related Requirements:

1. For construction checklists, comply with requirements in various Division 23 Sections specifying HVAC systems, system components, equipment, and products.

1.3 DEFINITIONS

A. BAS: Building automation system.

B. Cx: Commissioning, as defined in Section 019113 "General Commissioning Requirements."

C. CxA: Commissioning Authority, as defined in Section 019113 "General Commissioning Requirements."

D. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they mean "as-built" systems, assemblies, subsystems, equipment, and components.

E. TAB: Testing, adjusting, and balancing.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For BAS and HVAC testing technician.

B. Construction Checklists:

1. Draft Cx plan, including draft construction checklists to be prepared by CxA under Section 019113 "General Commissioning Requirements." Div. 23 Subcontractor is to review Construction Checklist in accordance with requirements in Section 019113 "General Commissioning Requirements" and ASHRAE 202 and to resolve any issues with the CxA.
2. Cx plan, including material, installation, and performance construction checklists for systems, assemblies, subsystems, equipment, and components relating to BAS and HVAC to be part of the Cx process and in accordance with requirements in Section 019113 "General Commissioning Requirements and ASHRAE 202."

C. Test Equipment and Instruments: For all test equipment and instruments to be used in conducting Cx tests by Div. 23 Subcontractor, provide the following:

1. Equipment/instrument identification number.
2. Planned Cx application or use.
3. Manufacturer, make, model, and serial number.
4. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.
5. Equipment manufacturers' proprietary instrumentation and tools. For each instrument or tool, identify the following:

    a. Instrument or tool identification number.
    b. Equipment schedule designation of equipment for which the instrument or tool is required.
    c. Manufacturer, make, model, and serial number.
    d. Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.

1.5 QUALITY ASSURANCE

A. HVAC Testing Technician Qualifications: Technicians to perform HVAC Construction Checklist verification tests, functional tests, and Cx test demonstrations shall have the following minimum qualifications:

1. Vocational school four-year-program graduate or a Bachelor or Associate's degree in mechanical engineering with coursework related to HVAC systems, air conditioning, Controls, or similar field. Degree may be offset by three years' experience in servicing mechanical systems in the HVAC industry. Generally, required knowledge includes BAS, HVAC systems, electrical concepts, building operations, and application and use of tools and instrumentation to measure performance of HVAC equipment, assemblies, and systems.
2. Commissioning certification from AABC(ACG), NEBB, BCCB (Building Commissioning Certification Board), ASHRAE, or similar professional organization.

B. Testing Equipment and Instrumentation Quality and Calibration:

1. Capable of testing and measuring performance within the specified acceptance criteria.

2. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
3. Be maintained in good repair and operating condition throughout duration of use on Project.
4. Be recalibrated/repaired if dropped or damaged in any way since last calibrated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 Cx PROCESS:

A. The Cx process shall be designed to test the performance of each HVAC system in actual operating conditions to verify and document that the HVAC systems function as designed in accordance with the specified sequences of operation.

B. Perform Cx process in accordance with Section 019113 "General Commissioning Requirements" for BAS and HVAC and in accordance with the following:

1. ASHRAE 202.
2. Commissioning standards acceptable to the authority having jurisdiction.

3.2 CONSTRUCTION CHECKLISTS

A. The Commissioning Authority shall prepare~~Prepare~~ preliminary detailed construction checklists (Prefunctional Test Checklists) for each BAS and HVAC system, assembly, subsystem, equipment, and component required to be commissioned, as detailed in ASHRAE 202.

1. Submit preliminary construction checklists to ~~CxA~~ Contractor and Designer for review.
2. When review comments have been resolved, the CxA will provide final construction checklists marked "Approved for Use, (date)."
3. Use only construction checklists, marked "Approved for Use, (date)" when performing tests. Mark construction checklists in the appropriate place, as indicated Project events are completed and provide pertinent details and other information.

B. Systems required to be commissioned:

1. VRF systems including temperature control function, heat recovery functions, and controls.

2. Air-handling systems, including the following:

a. Supply and return air fans, motors, and drives.
b. Automatic and gravity dampers.
c. ~~Heating and cooling devices.~~Hot water/glycol heating coils.
d. Humidification and dehumidification devices.
e. Air filters.
f. Interlock between air-handling system and fire/smoke alarm system.

~~f.~~g. VRF cooling coils.

3. Air duct systems, including the following:

a. VAV boxes and their heating coils.
~~a.~~b. Motorized dampers.

4. Steam and hydronic distribution systems, including the following:

a. Steam distribution piping systems and steam traps.
b. Cooling coil condensate~~Condensate~~ piping systems, including condensate pumps and all accessories.
c. Hydronic piping systems and accessories.
d. Pumps and accessories.
e. Heat Exchangers.
f. Meters and gauges.
~~g. Heat tracing.~~

5. Heating and cooling terminal and unitary equipment, including the following:

a. Unit heaters.
b. ~~Fan-coil units.~~Convectors.
c. Finned-tube radiation.

6. TAB Verification:

a. Airflow.
b. Water flow.

~~7. Documentation:~~

~~a. Mechanical systems manuals.~~
~~b. Documentation of required commissioning.~~

3.3 Cx TESTING PREPARATION

A. Certify that HVAC instrumentation and control systems have been completed and calibrated, point-to-point checkout has been successfully completed, and systems are operating in accordance with their design sequence of operation, Contract Documents, and approved submittals. Certify that all sensors are operating within specified accuracy and all systems are set to and maintaining set points as required by the design documents.

B. Certify that TAB procedures have been completed and that TAB reports have been submitted, discrepancies corrected, and corrective work approved.

C. Set systems, subsystems, and equipment into operating mode to be tested in accordance with approved test procedures (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

3.4 Cx TEST CONDITIONS

A. Perform tests using design conditions, whenever possible.

1. Simulated conditions may, with approval of Engineer of Record, be imposed using an artificial load when it is impractical to test under design conditions. Set simulated conditions as directed by CxA, and document simulated conditions and methods of simulation. After tests, return configurations and settings to normal operating conditions.
2. Cx test procedures may direct that set points be altered when simulating conditions is impractical.
3. Cx test procedures may direct that sensor values be altered when design or simulating conditions and altering setpoints~~set points~~ are impractical.

B. If tests cannot be completed because of a deficiency outside the scope of the HVAC system, document the deficiency and report it to Architect. After deficiencies are resolved, reschedule tests.

C. If seasonal testing is specified, complete appropriate initial performance tests and documentation, and schedule seasonal tests.

3.5 Cx TESTS COMMON TO HVAC SYSTEMS

A. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions, to verify compliance with acceptance criteria.

B. Test systems, assemblies, subsystems, equipment, and components for operating modes, interlocks, control responses, responses to abnormal or emergency conditions, and response in accordance with acceptance criteria.

C. Coordinate schedule with, and perform Cx activities at the direction of, CxA.

D. Provide technicians, instrumentation, tools, and equipment to perform and document the following:

1. Cx Construction Checklist verification tests.

E. The mechanical contractor and ATC contractors shall provide technicians as needed to support the Functional Testing process, make corrections to equipment, control programming and tuning found to be faulty or performing poorly during functional testing.

3.6 HEATING CONTROL SYSTEM Cx TESTS

~~3.6~~A. Heating system control refers to both the glycol/water system and the hot water system.

~~A.~~B. Heating-Water Supply Temperature Control:

1. Prerequisites: Installation verification of the following:

a. Startup of steam to hot-water converter.

b. Startup of heating-water pump(s).
c. TAB of heating-water flow and pressure.
d. Input Device: Heating-water supply temperature; thermostat.
e. Output Device: Control valve.
f. Display the following at the operator's workstation:

1) Heating-water supply temperature.
2) Heating-water supply temperature setpoint~~set point~~.
3) Control-valve position(s).

2. Scope: Heating-water system.
3. Purpose: Control of heating-water supply temperature at input device.
4. Conditions of the Test:

a. Minimum heating-water flow.
b. Midrange Heating-Water Flow: 50 to 60 percent of maximum.
c. Maximum heating-water flow.

5. Acceptance Criteria: Under all conditions, heating-water supply temperature is within plus or minus 2.0 deg F of set point.

~~B.~~C. Heating-Water Supply Temperature Reset:

1. Prerequisites: Installation verification of the following:

a. Startup of steam to hot-water converter.
b. Startup of heating-water pump(s).
c. TAB of heating-water flow and pressure.
d. Input Device: Heating-water supply temperature; thermostat.
e. Input Device: Outdoor-air temperature; outdoor-air sensor.
f. Output Device: Control valve.
g. Display the following at the operator's workstation:

1) Outdoor-air temperature.
2) Heating-water supply temperature.
3) Heating-water supply temperature set point.
4) Control-valve position.

2. Scope: Heating-water system.
3. Purpose: Control of heating-water supply temperature at heating-water supply temperature input device in response to variable outdoor-air temperature input; outdoor-air sensor.
4. Conditions of the Test: Outdoor-air temperature input value may be overridden for this test.

a. Low Temperature: Outdoor-air temperature between minus 20 and 0 deg F.
b. Midrange Temperature: Outdoor-air temperature between 30 and 45 deg F.
c. High Temperature: Outdoor-air temperature above 65 deg F.

5. Acceptance Criteria: Heating-water supply temperature resets in straight-line relationship with outdoor-air temperature for the following reset schedule. Under all conditions, heating-water supply temperature is within 2.0 deg F of set point.

    a. 195 deg F heating water when outdoor-air temperature is minus 3 deg F.
    b. 130 deg F heating water when outdoor-air temperature is 65 deg F.
    c. Under all conditions, heating-water supply temperature is within plus or minus 2.0 deg F of set point.

~~C.~~D. Control Primary Circulating Pump(s):

1. Prerequisites: Installation verification of the following:

    a. Startup of heating-water pump(s).
    b. Input Device: Outdoor-air temperature; outdoor-air sensor.
    c. Output Device: Heating-water pump; DDC system command to starter relay.
    d. Display the following at the operator's workstation:

        1) Outdoor-air temperature.
        2) Operating status of primary circulating pump(s).

2. Scope: Heating-water pump(s) and associated controls.
3. Purpose: On-off control of heating-water pump(s) in response to variable outdoor-air temperature input; outdoor-air sensor.
4. Conditions of the Test:

    a. High Temperature: Outdoor-air temperature above 65 deg F.
    b. Low Temperature: Outdoor-air temperature below 65 deg F.

5. Acceptance Criteria:

    a. High Temperature: Pump(s) are off when outside-air temperature is above 65 deg F.
    b. Low Temperature: Pump(s) are on when outside-air temperature is below 65 deg F.

3.7 TERMINAL UNIT EQUIPMENT Cx TESTS

A. VAV Terminal Air Units with Coils:

1. Prerequisites: Installation verification of the following:

    a. Occupancy Output Device: DDC system binary output.
    b. Room Temperature Input Device: Room thermostat.
    c. Room Temperature Output Device: Electronic damper actuators and control-valve operators.
    d. Display the following at the operator's workstation:

        1) Room/area served.
        2) Room occupied/unoccupied.

3) Room temperature indication.
4) Room temperature set point.
5) Room temperature set point, occupied.
6) Room temperature set point, unoccupied.
7) Air-damper position as percentage open.
8) Control-valve position as percentage open.

2. Scope: VAV terminal air units with hydronic coils in supply-air systems, and associated controls.
3. Purpose:

a. Occupancy-dependent room temperature set-point reset.
b. Room temperature control.

4. Conditions of the Test:

a. Cx Test Demonstration Sampling Rate: 10 percent of each model/size unit.
b. Temperature Control - Occupied: Start with the room unoccupied. Occupy the room and observe the change to occupied status. Observe temperature control until room temperature is stable at occupied setpoint~~set point~~, plus or minus 1.0 deg F.
c. Temperature Control - Unoccupied: Start with the room occupied. Vacate the room and observe the change to unoccupied status. Observe temperature control until room temperature is stable at unoccupied setpoint~~set point~~, plus or minus 1.0 deg F.

5. Acceptance Criteria:

a. Temperature Control - Occupied:

1) Control system status changes from "occupied" to "unoccupied" after the specified time.
2) Room temperature is stable at occupied set point, plus or minus 1.0 deg F within 10 minutes of occupancy. Room temperature does not overshoot or undershoot set point by more than 2.0 deg F during transition.

b. Temperature Control - Unoccupied:

1) Control system status changes from "unoccupied" to "occupied" after five minutes of continuous occupancy.
2) Room temperature is stable at unoccupied set point, plus or minus 1.0 deg F within 30 minutes of occupancy.

3.8 AIR-HANDLING SYSTEM Cx TESTS

~~3.8~~A. Each of the air-handling systems include some (but not all) of the following devices. Cx shall test the equipment and control sequences applicable to each AHU.

~~A.~~B. Supply Fan(s) Variable-Volume Control:

1. Prerequisites: Installation verification of the following:

a. Volume-Control Input Device: Static-pressure transmitter sensing supply-duct static pressure referenced to conditioned-space static pressure.
b. Volume-Control Output Device: DDC system analog output to modulating damper actuator. Set variable-speed drive to minimum speed when fan is stopped.
c. High-Pressure Input Device: Static-pressure transmitter sensing supply-duct static pressure referenced to static pressure outside the duct.
d. High-Pressure Output Device: DDC system binary output ~~to~~.
e. Display the following at the operator's workstation:

1) Supply-fan-discharge static-pressure indication.
2) Supply-fan-discharge static-pressure set point.
3) Supply-fan airflow rate.
4) Supply-fan speed.

2. Scope: VAV supply fan units and associated controls.
3. Purpose:

a. Supply-air discharge static pressure control.
b. Response to excess supply-air discharge static pressure condition.

4. Conditions of the Test:

a. Minimum supply-air flow.
b. Midrange Supply-Air Flow: 50 to 60 percent of maximum.
c. Maximum supply-air flow.
d. Excess supply-air discharge static pressure.

5. Acceptance Criteria:

a. At all supply-air flow rates, and during changes in supply-air flow, discharge air static pressure is at setpoint~~set point~~ plus or minus 2 percent.
b. Fan stops and an alarm is initiated at the operator's workstation when supply-air discharge static pressure is at the excess static pressure, plus or minus 2 percent.

~~B.~~C. Air-Handler Outside-Air Control:

1. Prerequisites: Installation verification of the following:

a. Output Device: DDC system analog output to modulating damper actuator(s).
b. Outside air flow measuring device.
c. Supply-Air Temperature Input Device: Duct-mounted temperature sensor.
d. Cooling Reset Input Device: Outdoor- and return-air, duct-mounted thermostats.
e. Display the following at the operator's workstation:

1) Mixed-air-temperature indication.
2) Mixed-air-temperature setpoint~~set point~~.
3) Mixed-air damper position.

2. Scope: Air handler with mixed-air control and associated controls.
3. Purpose:

a. Occupied time control.
b. Minimum damper position control.
c. Outside Air control in response to CO2 concentration (Demand Controlled Ventilation).
d. Heating reset control.
e. Supply-air temperature control.
f. Mixed-air temperature control.
g. Cooling reset control.
h. Unoccupied time control.

4. Conditions of the Test:

a. Occupied Time Control: Start in unoccupied schedule. Advance to occupied schedule time.
b. Minimum Outdoor Damper Position Control: Command system to occupied mode to verify the outside air dampers open to the minimum damper position as balanced. Override CO2 above baseline concentration and observe outside air damper position.
c. Heating Reset Control: Create a call for heating. Raise room thermostat set point to a value 2.0 deg F above current space temperature and observe system response.
d. Cooling Reset Control: Create a call for cooling. Lower room thermostat set point to a value 2.0 deg F below current space temperature and observe system response.
e. Unoccupied Time Control: Advance to unoccupied schedule time and verify system enters unoccupied mode.

5. Acceptance Criteria:

a. Occupied Time Control: Mixed-air control is active in occupied mode.
b. Minimum Damper Position Control: Controller positions outdoor-air dampers to minimum position.
c. Heating Reset Control: Controller sets outdoor-air dampers to minimum position, then modulates the heating coil valve open to maintain space temperature at set point, plus or minus 1.0 deg F.
d. Cooling Reset Control: Controller sets outdoor-air dampers to minimum position when outdoor-air enthalpy exceeds return-air enthalpy.
e. Unoccupied Time Control: Controller positions outdoor- and relief-air dampers closed and return-air dampers open.
f. Control Data Trend Log: Data verify control in accordance with sequence of control.

3.9 ERV AND DOAS UNIT Cx TESTS

A. ERV supply fan(s) constant volume controls.

B. DOAS supply fan(s) constant volume control.

C. When Outside Air is Warm and Humid: DOAS unit dehumidification, liquid subcooling, and hot gas reheat control.

~~f.~~D. When Outside Air is Cold and Dry: DOAS unit hot water heating control and humidifier control.

END OF SECTION 230800

CODE SUMMARY

THE DESIGN OF THIS PROJECT CONFORMS TO THE FOLLOWING APPLICABLE CODES AND GOVERNMENT REQUIREMENTS:

INTERNATIONAL BUILDING CODE (IBC), 2015 AS AMENDED BY CHAPTER 3 OF THE MAINE UNIFORM BUILDING AND ENERGY CODE (MUBEC)

INTERNATIONAL EXISTING BUILDING CODE (IEBC), 2015 AS AMENDED BY CHAPTER 4 OF THE MUBEC; ADOPTS CHAPTERS 1-16 AND APP A-C BY REFERENCE

INTERNATIONAL ENERGY CONSERVATION CODE (IECC), 2009 AS AMENDED BY CHAPTER 6 OF THE MUBEC

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS (ASHRAE) STANDARDS ADOPTED AS AMENDED BY MUBEC CHAPTER 3 – IBC, CHAPTER 4- IEBC AND CHAPTER 6 - IECC

STATE OF MAINE RULES OF THE STATE FIRE MARSHAL (ME RSFM)

STATE OF MAINE - ASBESTOS REMOVAL

AUGUSTA CODE OF ORDINANCES – PART III GENERAL LEGISLATION

PROJECT DATA

BUILDING AREA:

BASEMENT	4,313 SF
FIRST LEVEL	43,564 SF
SECOND LEVEL	44,801 SF
THIRD LEVEL	44,065 SF
FOURTH LEVEL	16,892 SF
FIFTH LEVEL	7,570 SF
TOTAL AREA	161,205 SF

BUILDING HEIGHT: 71 FT

NUMBER OF STORIES: 5 STORIES

FIRE PROTECTION: PARTIALLY SPRINKLERED

BUILDING OCCUPANCIES: IBC: GROUP A-3 ASSEMBLY, GROUP B BUSINESS, GROUP S-1 STORAGE, GROUP F-1 FACTORY
NFPA 101: ASSEMBLY, BUSINESS, STORAGE, ALL WITH BUILDING SERVICE AREAS

CONSTRUCTION TYPE: TYPE I-B

PROPOSED WORK: ASBESTOS ABATEMENT, MECHANICAL SYSTEM UPGRADES WITH RELATED WORK, ELECTRICAL ROOM WALL REPLACEMENT

NO CHANGE IN OCCUPANCY; NO RECONFIGURATION OF SPACE; NO ADDITIONS.

THE ARCHITECTURAL, ELECTRICAL AND FIRE PROTECTION SYSTEMS MODIFICATIONS FOR THIS PROJECT ARE CONSIDERED LEVEL 1 ALTERATIONS PER THE 2015 IEBC. THE EXISTING LEVEL OF PROTECTION PROVIDED FOR THE MEANS OF EGRESS SYSTEM WILL BE MAINTAINED. REPLACEMENT OF ARCHITECTURAL, ELECTRICAL, AND FIRE PROTECTION SYSTEMS SHALL BE IN COMPLIANCE WITH THE 2015 IBC WHERE REFERENCED BY CHAPTER 7 OF THE 2015 IEBC.

THE MECHANICAL SYSTEM UPGRADES ARE CONSIDERED A LEVEL 2 ALTERATION PER THE 2015 IEBC. WORK ASSOCIATED WITH THE MECHANICAL SYSTEM UPGRADES SHALL COMPLY WITH THE 2015 IEBC CHAPTER 8 AND THE 2015 I-CODES WHERE REFERENCED BY THE IEBC.

REFER TO SHEET **GI005B** FOR CODE ANALYSIS.

ACCESSIBILITY:

THE PROJECT IS CONSIDERED AN ALTERATION IN ACCORDANCE WITH , THE COST OF WHICH IS LESS THAN 75% OF THE REPLACEMENT COST OF THE COMPLETED FACILITY. THE FOLLOWING BARRIER REMOVALS ARE INCLUDED IN THIS PROJECT:
- ADA COMPLIANT DOOR HARDWARE ON DOORS BEING REPLACED
- REMOVAL OF NON-COMPLIANT RAMPS WITHIN THIRD LEVEL MUSEUM EXHIBITS; A SEPARATE PROJECT IS UNDER DEVELOPMENT THAT WILL ADDRESS ACCESSIBILITY OF THESE EXHIBIT AREAS

DELEGATED DESIGN

DELEGATED DESIGN SCOPE OF WORK

CONTRACTOR SHALL PROVIDE DELEGATED DESIGN SERVICES FOR THE PROTECTIVE PLATFORMS AND ENCLOSURES WITHIN THE MUSEUM EXHIBIT AREAS AS DEFINED ON THE DRAWINGS. REFER TO THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS FOR EXHIBIT PROTECTION.

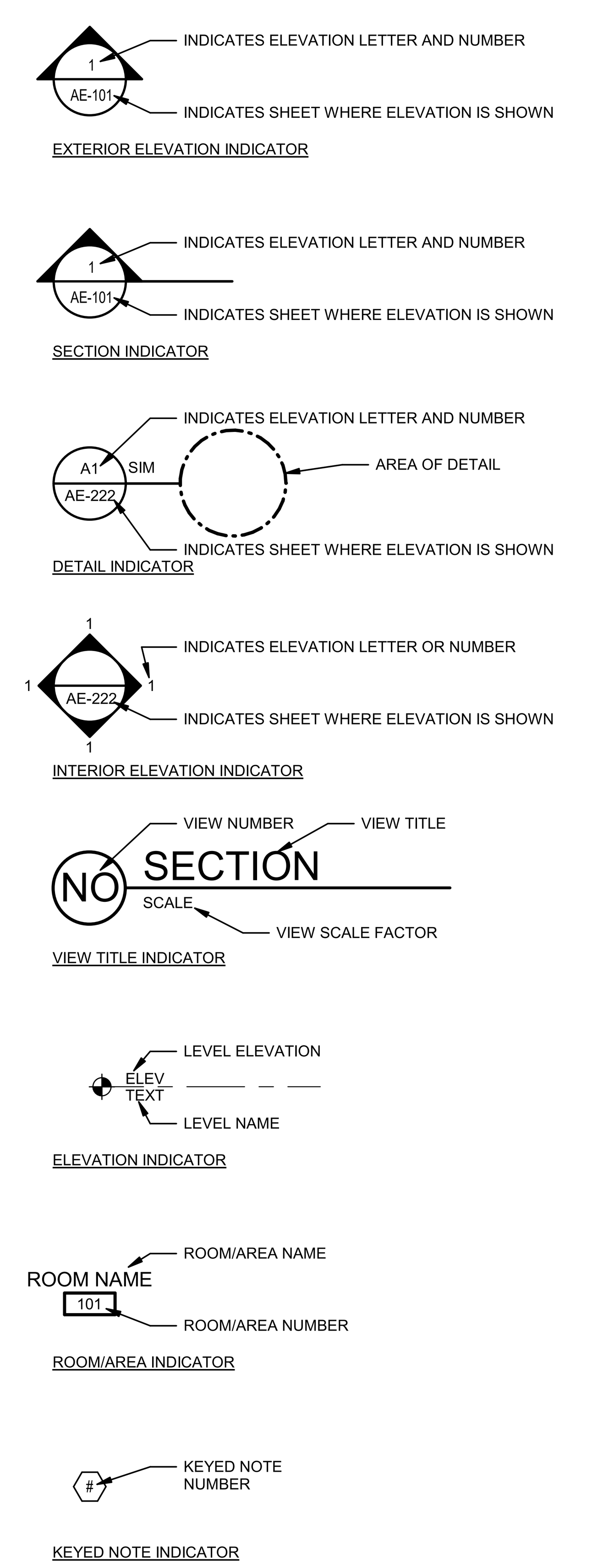
STRUCTURAL REQUIREMENTS
THE PLATFORMS SHALL BE DESIGNED TO SUPPORT THE CONSTRUCTION LOADS PRESCRIBED IN ASCE 37-14. THE MINIMUM CONCENTRATED PERSONNEL LOADS ARE GREATER OF 250 LBS DISTRIBUTED ABOUT AN AREA OF 1 FT BY 1 FT OR A DISTRIBUTED LOAD OF 50 PSF FOR MEDIUM DUTY CONSTRUCTION. MINIMUM HORIZONTAL LOADS ARE THE GREATER OF THE SELF-WEIGHT OF THE STRUCTURE SUBJECTED TO EARTHQUAKE LOADS WITH A RISK CATEGORY OF II OR 50 LB/PERSON APPLIED AT THE LEVEL OF THE PLATFORM ANY DIRECTION. IF DISTURBING WOOD EXHIBIT PLATFORM OR SURROUNDING WALL CONSTRUCTION IS REQUIRED FOR PLATFORM SUPPORTS, SUBMIT LOCATIONS IN WORK PLAN FOR APPROVAL

ARCHITECTURAL REQUIREMENTS
THE HORIZONTAL SURFACE OF THE PLATFORMS AND ENCLOSURES SHALL HAVE A RIGID SUBSTRATE (WHICH MAY SERVE AS A STRUCTURAL DIAPHRAGM). A WATERTIGHT MEMBRANE SHALL BE PROVIDED ON THE ENTIRE HORIZONTAL SURFACE AND PREVENT WATER AND/OR DUST FROM ENTERING BELOW THE PLATFORM OR ENCLOSURE, INCLUDING AROUND THE EDGES. A SURFACE PROTECTION LAYER SHALL BE PROVIDED OVER THE WATERTIGHT MEMBRANE TO PREVENT DAMAGE FROM TOOLS, EQUIPMENT, LADDERS, FOOT TRAFFIC AND OTHER CONSTRUCTION ACTIVITIES.

THE VERTICAL SURFACES OF THE PLATFORMS AND ENCLOSURES, WHERE APPLICABLE, SHALL HAVE PLASTIC SHEETING (OR SIMILAR) COVERING OVER THE STRUCTURAL FRAMING WITH ALL SEAMS WATERTIGHT. A RIGID SUBSTRATE MAY BE NECESSARY FOR STRUCTURAL PURPOSES, IN WHICH CASE THE PLASTIC SHEETING WOULD BE APPLIED OVER THE RIGID SUBSTRATE. EACH VERTICAL PLANE OF THE PLATFORM OR ENCLOSURE SHALL HAVE VIEWING PORTS STARTING ROUGHLY 48" ABOVE THE ADJACENT FLOOR. THE VIEWING PORTS SHALL BE NO LESS THAN 18" IN ANY DIRECTION. THE VIEWING PORTS SHALL BE SPACED 8'-0" O/C (MAX) WITH NO LESS THAN 2 PORTS ON ANY SIDE. A MINIMUM OF (1) OSHA COMPLIANT POINT OF ENTRY SHALL BE PROVIDED AT EACH PLATFORM OR ENCLOSURE LOCATION, IF NOT ALREADY INDICATED ON THE DRAWINGS.

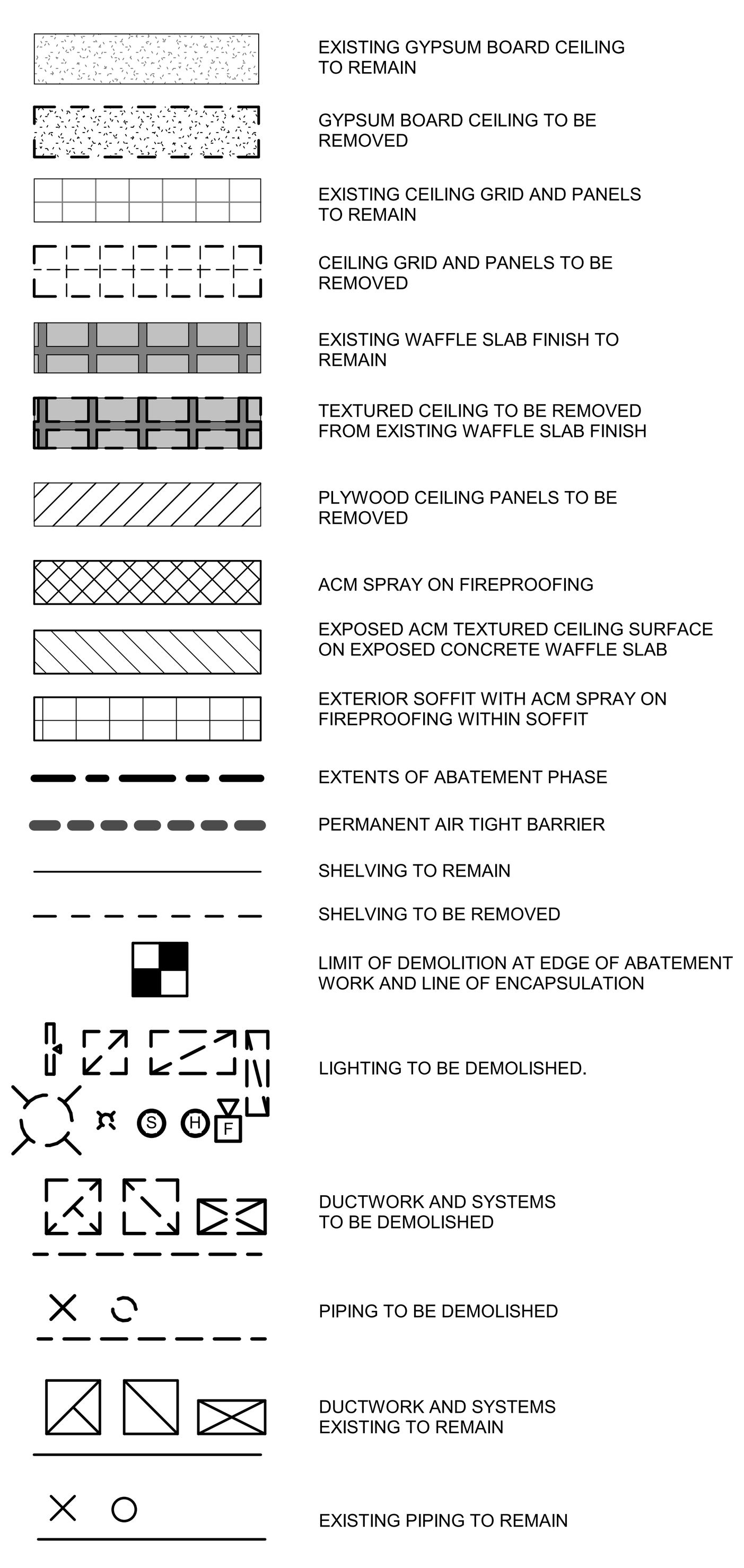
OTHER REQUIREMENTS
PROVIDE PASSIVE VENTILATION FROM THE BOUNDARY OF THE ENCLOSURE TO OUTSIDE THE CONSTRUCTION CONTAINMENT AREA IN THE FORM OF A FLEXIBLE HOSE DUCTING OR SIMILAR. GENERAL ENVIRONMENTAL CONDITIONS WITHIN OR UNDER THE PLATFORMS OR ENCLOSURES SHALL BE THE SAME AS THE OVERALL SPACE THE ENCLOSURES OR PLATFORMS ARE IN.

LEGEND



HAZ MAT LEGEND

(APPLICABLE TO HD SERIES AND HA SERIES)



ABBREVIATIONS

A/E	ARCHITECT/ENGINEER
ACT	ACOUSTICAL CEILING TILE
ADA	AMERICANS WITH DISABILITIES ACT
AFF	ABOVE FINISHED FLOOR
ALUM	ALUMINUM
APC	ACOUSTICAL PANEL CEILING
BAT	BATTEN
BD	BOARD
BITUM	BITUMINOUS
BLDG	BUILDING
BOT	BOTTOM
BS	BOTH SIDES
CAB	CABINET
CD	CONSTRUCTION DOCUMENTS
CF	CONTRACTOR FURNISHED
CF/CI	CONTRACTOR FURNISHED/CONTRACTOR INSTALLED
CF/GI	CONTRACTOR FURNISHED/GOVERNMENT INSTALLED
CF/OI	CONTRACTOR FURNISHED/OWNER INSTALLED
CIP	CAST-IN-PLACE
CJ	CONSTRUCTION JOINT OR CONTROL JOINT
CLG	CEILING
CLR	CLEAR
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
CONC	CONCRETE
CONT	CONTINUE
COORD	COORDINATE
CT	CERAMIC TILE
D	DEPTH
DBL	DOUBLE
DEG	DEGREE
DEMO	DEMOLITION
DET	DETAIL
DIA	DIAMETER
DIM	DIMENSION
DOC	DOCUMENT
DWG	DRAWING
(E)	EXISTING
E	EAST
EFS	EXTERIOR FINISH SYSTEM
EIFS	EXTERIOR INSULATION AND FINISH SYSTEM
EJ	EXPANSION JOINT
EL	ELEVATION
ELEV	ELEVATOR
EQ	EQUAL
EQUIP	EQUIPMENT
ETC	ET CETERA OR AND SO FORTH
EXIST	EXISTING
FD	FLOOR DRAIN
FDTN	FOUNDATION
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FF EL	FINISH FLOOR ELEVATION
FF&E	FURNITURE, FIXTURE AND EQUIPMENT
FIN FLR	FINISH FLOOR
FIXT	FIXTURE
FLASH	FLASHING
FLR FIN	FLOOR FINISH
FT	FOOT OR FEET
FTG	FOOTING
GA	GAGE OR GYPSUM ASSOCIATION
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GSB	GYPSUM SHEATHING BOARD
GYP	GYPSUM
GYP BD	GYPSUM BOARD
H	HIGH
HAZ MAT	HAZARDOUS MATERIALS
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HT	HEIGHT
IBC	INTERNATIONAL BUILDING CODE
ID	INSIDE DIAMETER, IDENTIFICATION OR INTERIOR DESIGN
INCL	INCLUDED
INFO	INFORMATION
INSUL	INSULATION
INT	INTERIOR
JAN	JANITOR
JAN CLO	JANITOR CLOSET
J-BOX	JUNCTION BOX
L	ANGLE
LAM	LAMINATE
LAV	LAVATORY
LF	LINEAR FEET (FOOT)
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LT GA	LIGHT GAGE
LVR	LOUVER
LYR	LAYER
MAINT	MAINTENANCE
MATL	MATERIAL
MAX	MAXIMUM
MECH	MECHANICAL
MEMB	MEMBRANE
MEZZ	MEZZANINE
MFR	MANUFACTURER
MFR REC	MANUFACTURER'S RECOMMENDATION
MISC	MISCELLANEOUS
MO	MASONRY OPENING
MTL	METAL

N	NORTH
NA	NOT APPLICABLE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NO	NUMBER
OC	ON CENTER
OD	OUTSIDE DIAMETER
OF/CI	OWNER FURNISHED/CONTRACTOR INSTALLED
OF/OI	OWNER FURNISHED/OWNER INSTALLED
OPP	OPPOSITE
OPT	OPTIONAL
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
PART	PARTIAL
PLAM	PLASTIC LAMINATE
PLBG	PLUMBING
PLYWD	PLYWOOD
PR	PAIR
PREFAB	PREFABRICATE
PT	PAINT OR PRESSURE TREATED
PTN	PARTITION
QA	QUALITY ASSURANCE
QC	QUALITY CONTROL
QT	QUARRY TILE
R	RADIUS
RB	RUBBER BASE OR RESILIENT BASE
RCP	REFLECTED CEILING PLAN
RD	ROOF DRAIN
REF	REFERENCE OR REFRIGERATOR
REQ	REQUIRE
REQD	REQUIRED
RESIL	RESILIENT
REV	REVISION
RM	ROOM
RO	ROUGH OPENING
SAT	SUSPENDED ACOUSTICAL TILE
SCHED	SCHEDULE
SECT	SECTION
SF	SQUARE FOOT (FEET)
SHT	SHEET
SIM	SIMILAR
SK	SKETCH
SPEC	SPECIFICATION
SQ IN	SQUARE INCH
SST	STAINLESS STEEL
STC	SOUND TRANSMISSION CLASS
STD	STANDARD
STL	STEEL
STOR	STORAGE
STRUCT	STRUCTURAL
SUSP	SUSPENDED
SUSP CLG	SUSPENDED CEILING
SYM	SYMBOL
T&G	TONGUE AND GROOVE
TEMP	TEMPORARY
THK	THICKNESS
THRU	THROUGH
TO	TOP OF
TO FDN	TOP OF FOUNDATION
TOB	TOP OF BEAM
TOM	TOP OF MASONRY
TOP	TOP OF PARAPET
TOS	TOP OF STEEL
TYP	TYPICAL
UFC	UNIFORM FIRE CODE
UNO	UNLESS NOTED OTHERWISE
VAR	VARIES OR VARIATION
VB	VINYL BASE
VCT	VINYL COMPOSITION TILE
VERT	VERTICAL
VIF	VERIFY IN FIELD
VTR	VENT THROUGH ROOF
W	WEST OR WIDE
W/	WITH
W/O	WITHOUT
WD	WOOD
WF	WIDE FLANGE
WT	WEIGHT
X BRACE	CROSS BRACE
YD	YARD

PHASE 2 - PROJECT DESCRIPTION

RENOVATION OF THE CULTURAL BUILDING TO REMOVE ASBESTOS CONTAINING MATERIALS AND TO UPGRADE THE MECHANICAL SYSTEMS. ARCHITECTURAL FEATURES, BUILDING SYSTEMS AND DEVICES THROUGHOUT SHALL BE REMOVED AND REINSTALLED TO ACCOMMODATE THE ASBESTOS ABATEMENT ACTIVITIES. ARCHITECTURAL, STRUCTURAL, ELECTRICAL AND BUILDING AUTOMATION SYSTEMS MODIFICATIONS ARE INCLUDED AS NECESSARY TO SUPPORT THE MECHANICAL SYSTEM UPGRADES.

THE PROJECT INCLUDES PROVIDING PROTECTIVE ENCLOSURES FOR PROTECTION OF EXHIBITS REMAINING IN PLACE DURING THE WORK. EXHIBIT PROTECTION SHALL BE CONSTRUCTED PRIOR TO ASBESTOS ABATEMENT ACTIVITIES AND REMAIN IN PLACE FOR THE DURATION OF THE RENOVATION ACTIVITIES.

THE EXISTING BUILDING IS APPROXIMATELY 161,205 SF ON FIVE FLOORS AND A PARTIAL BASEMENT. THE INTERIOR SPACES INCLUDE MUSEUM EXHIBITS, ARCHIVES STORAGE, LIBRARY STACKS, PUBLIC LIBRARY SPACE, PUBLIC RESEARCH SPACE, MEETING SPACE, SEPARATE ADMINISTRATIVE SPACE FOR ALL THREE CULTURAL AGENCIES, A WORKSHOP, A MAILROOM, A LOADING DOCK, AND GENERAL STORAGE. ASBESTOS CONTAINING MATERIAL IS PRESENT THROUGHOUT MUCH OF THE BUILDING, INCLUDING SPRAY-APPLIED FIRE-PROOFING.

GENERAL NOTES

1. ALL WORK INCLUDED IN THIS CONTRACT SHALL CONFORM TO ALL STATE, NATIONAL AND OTHER CODES AND ORDINANCES WHICH APPLY TO THIS PROJECT.
2. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS PRIOR TO CONSTRUCTION AND REPORT ANY DISCREPANCIES TO THE ARCHITECT. THE CONTRACTOR SHALL PROCEED WITH THE WORK ONLY AFTER THE DISCREPANCIES HAVE BEEN RESOLVED AND APPROVED BY THE ARCHITECT AND OWNER.
3. THE CONTRACTOR SHALL PROTECT EXISTING SYSTEMS AND SURFACES TO REMAIN. ALL DAMAGE RESULTING FROM THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED AS APPROVED BY THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS WHICH ARE REQUIRED FOR THE SATISFACTORY COMPLETION OF WORK.
5. THE CONTRACTOR SHALL PROVIDE BARRICADES AT ALL WORK AREAS TO PREVENT PERSONNEL FROM ENTERING AREAS OF WORK.
6. THE CONTRACTOR SHALL COORDINATE THE TIMING AND SEQUENCE OF WORK WITH THE OWNER.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL AND DISPOSAL OF ALL DEMOLITION MATERIALS UNLESS NOTED TO SALVAGE AND TURN OVER TO THE OWNER.
8. COORDINATE CLEANING OF THE WORK AREA WITH ALL APPLICABLE CITY, STATE AND FEDERAL REGULATIONS.
9. EXECUTE WORK IN A CAREFUL AND ORDERLY MANNER WITH LEAST POSSIBLE DISTURBANCE TO THE PUBLIC AND BUILDING OCCUPANTS.
10. DIMENSIONS OF ALL REPLACEMENT MATERIALS SHALL MATCH EXISTING MATERIAL DIMENSIONS, UNLESS NOTED OTHERWISE.

ADDITIVE BID ALTERNATES

BID ALTERNATE 1:

ELECTRICAL:

- REMOVE EXISTING GENERATOR AND TRANSFER SWITCH. MAINTAIN EXISTING FEEDERS.
- PROVIDE REPLACEMENT GENERATOR AND TRANSFER SWITCH. CONNECT EXISTING FEEDERS.

BID ALTERNATE 2:

REPLACE EXTERIOR DOORS, WINDOWS AND GLAZING SYSTEMS

ARCHITECTURAL:

- REMOVE EXTERIOR DOORS, WINDOW ASSEMBLIES, AND BLINDS. SALVAGE EXISTING BLINDS FOR REINSTALLATION. PREPARE OPENINGS TO RECEIVE NEW ASSEMBLIES
- PROVIDE REPLACEMENT THERMALLY BROKEN WINDOW ASSEMBLIES. REINSTALL SALVAGED BLINDS IN SAME LOCATION AS EXISTING.
- PROVIDE REPLACEMENT THERMALLY BROKEN CURTAIN WALL SYSTEM
- PROVIDE REPLACEMENT INSULATED EXTERIOR ENTRY DOOR ASSEMBLY AT LOADING DOCK.

B

BID ALTERNATE 3:

EXTERIOR VENEER SURFACE REPAIR & JOINT REPOINTING

ARCHITECTURAL:

- RAKE OUT AND REPOINT GRANITE PANEL HARD JOINTS
- RAKE OUT AND REPOINT GRANITE PANEL SOFT SEALANT JOINTS
- RAKE OUT AND REPOINT LIMESTONE PANEL HARD JOINTS
- RAKE OUT AND REPOINT CONCRETE PANEL SOFT SEALANT JOINTS
- RAKE OUT AND REPOINT SURFACE/MATERIAL TRANSITIONS

BID ALTERNATE 4:

EXTERIOR SURFACE CLEANING AND PRESERVATION

ARCHITECTURAL:

- CLEAN AND PRESERVE LIMESTONE PANELS OF STAINING AND DEGRADATION
- PATCH AND REPAIR CRACKED AND DAMAGED CEMENTITIOUS COATING ON CONCRETE SURFACES

C

BID ALTERNATE 5:

DEDUCT THE SCOPE FOR ABATEMENT AND ASSOCIATED HAZARDOUS MATERIAL DEMOLITION OF FOURTH FLOOR MECHANICAL ROOM 416 IN ITS ENTIRETY.

HAZARDOUS MATERIAL DEMOLITION:

- REMOVE EXISTING MECHANICAL EQUIPMENT AND ASSOCIATED PIPING, CONTROLS AND DUCTWORK.
- REMOVE EXISTING LIGHT FIXTURES AND CEILING MOUNTED DEVICES
- REMOVE EXISTING CEILING COVERING

HAZARDOUS ABATEMENT:

- REMOVE ACM CONTAINING SPRAY-ON FIREPROOFING

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AUGUSTA, MAINE 04333-0077
(207) 624-7314

LICENSED ARCHITECT
ELIZABETH HUCKINS
No. 4338
STATE OF MAINE
2/17/2022

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

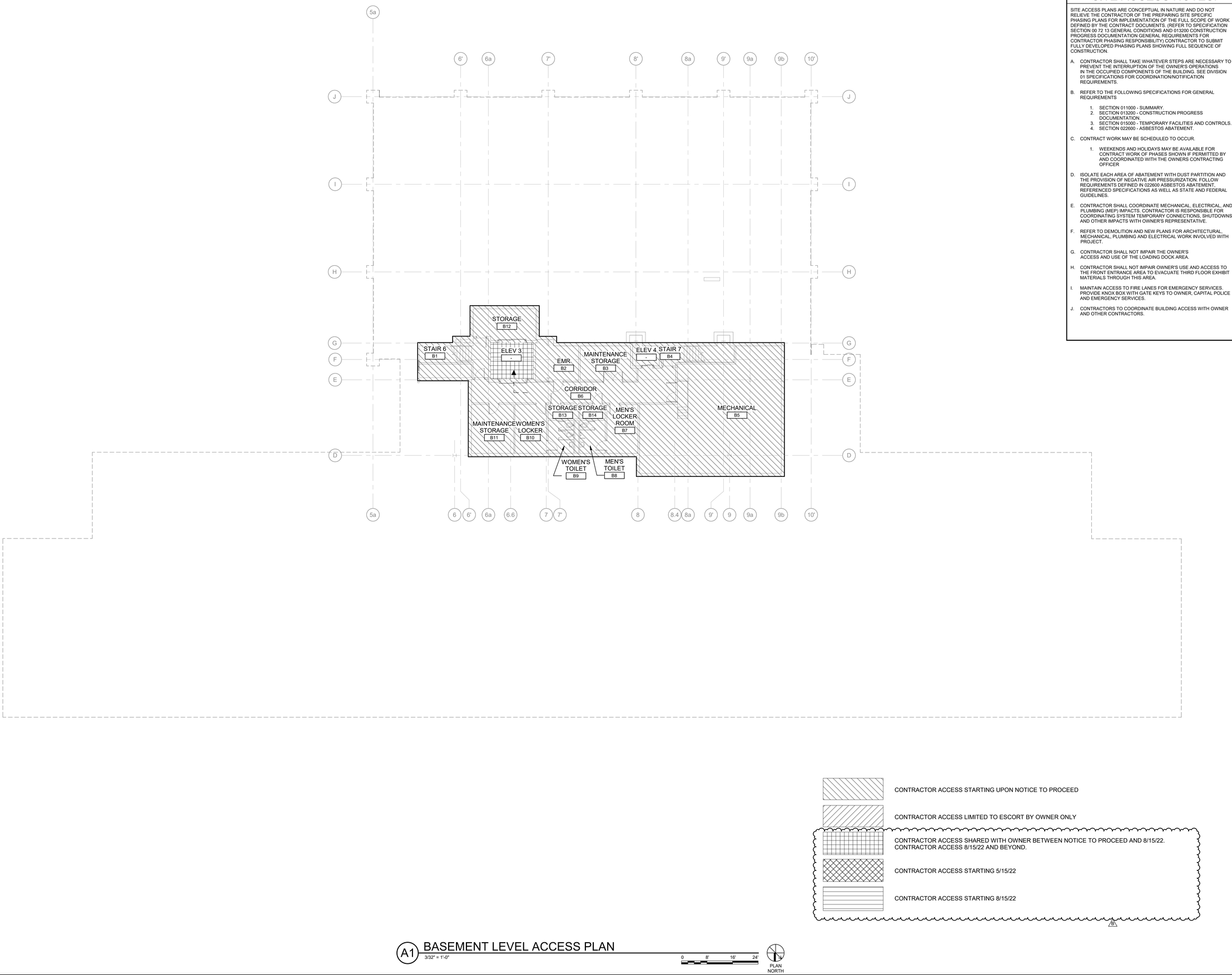
REV	REVISION ISSUE DESCRIPTION	DATE
C	ADDENDUM NO. 3	02-17-2022
B	ADDENDUM NO. 2	02-08-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	JLR

SHEET TITLE:
GENERAL INFORMATION

SHEET ID:
GI004B

NOT FOR CONSTRUCTION



SITE ACCESS NOTES:

SITE ACCESS PLANS ARE CONCEPTUAL IN NATURE AND DO NOT RELIEVE THE CONTRACTOR OF THE PREPARING SITE SPECIFIC PHASING PLANS FOR IMPLEMENTATION OF THE FULL SCOPE OF WORK DEFINED BY THE CONTRACT DOCUMENTS. (REFER TO SPECIFICATION SECTION 00 72 13 GENERAL CONDITIONS AND 013200 CONSTRUCTION PROGRESS DOCUMENTATION GENERAL REQUIREMENTS FOR CONTRACTOR PHASING RESPONSIBILITY) CONTRACTOR TO SUBMIT FULLY DEVELOPED PHASING PLANS SHOWING FULL SEQUENCE OF CONSTRUCTION.

A. CONTRACTOR SHALL TAKE WHATEVER STEPS ARE NECESSARY TO PREVENT THE INTERRUPTION OF THE OWNER'S OPERATIONS IN THE OCCUPIED COMPONENTS OF THE BUILDING. SEE DIVISION 01 SPECIFICATIONS FOR COORDINATION/NOTIFICATION REQUIREMENTS.

B. REFER TO THE FOLLOWING SPECIFICATIONS FOR GENERAL REQUIREMENTS

1. SECTION 011000 - SUMMARY.
2. SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION.
3. SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS.
4. SECTION 022600 - ASBESTOS ABATEMENT.

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D. ISOLATE EACH AREA OF ABATEMENT WITH DUST PARTITION AND THE PROVISION OF NEGATIVE AIR PRESSURIZATION. FOLLOW REQUIREMENTS DEFINED IN 022600 ASBESTOS ABATEMENT, REFERENCED SPECIFICATIONS AS WELL AS STATE AND FEDERAL GUIDELINES.

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CONTRACTOR ACCESS STARTING UPON NOTICE TO PROCEED

CONTRACTOR ACCESS LIMITED TO ESCORT BY OWNER ONLY

CONTRACTOR ACCESS SHARED WITH OWNER BETWEEN NOTICE TO PROCEED AND 8/15/22.
CONTRACTOR ACCESS 8/15/22 AND BEYOND.

CONTRACTOR ACCESS STARTING 5/15/22

CONTRACTOR ACCESS STARTING 8/15/22

B

A1 BASEMENT LEVEL ACCESS PLAN

3/32" = 1'-0"

0 8' 16' 24'

PLAN NORTH

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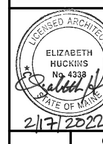

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION/ISSUE DESCRIPTION	DATE
B.	ADDENDUM NO. 3	02-17-2022
A.	ISSUED FOR BID	01-07-2022

PROJECT NO:	361820720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	BEB

SHEET TITLE:
BASEMENT LEVEL ACCESS PLAN

SHEET ID:
GC100B

NOT FOR CONSTRUCTION

SITE ACCESS NOTES:

SITE ACCESS PLANS ARE CONCEPTUAL IN NATURE AND DO NOT RELIEVE THE CONTRACTOR OF THE PREPARING SITE SPECIFIC PHASING PLANS FOR IMPLEMENTATION OF THE FULL SCOPE OF WORK DEFINED BY THE CONTRACT DOCUMENTS. (REFER TO SPECIFICATION SECTION 00 72 13 GENERAL CONDITIONS AND 013200 CONSTRUCTION PROGRESS DOCUMENTATION GENERAL REQUIREMENTS FOR CONTRACTOR PHASING RESPONSIBILITY) CONTRACTOR TO SUBMIT FULLY DEVELOPED PHASING PLANS SHOWING FULL SEQUENCE OF CONSTRUCTION.

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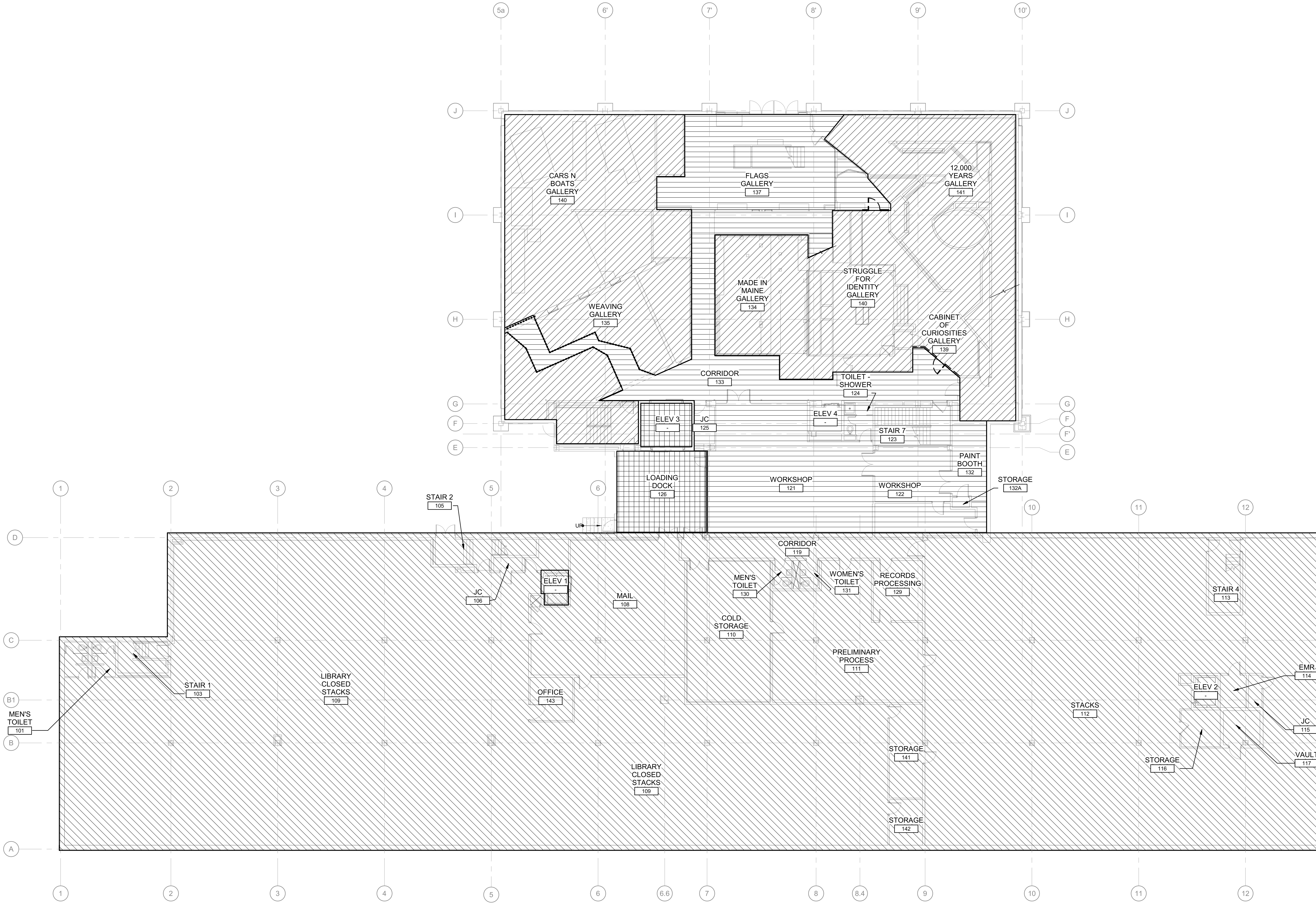

CONTRACTOR ACCESS STARTING UPON NOTICE TO PROCEED

CONTRACTOR ACCESS LIMITED TO ESCORT BY OWNER ONLY

CONTRACTOR ACCESS SHARED WITH OWNER BETWEEN NOTICE TO PROCEED AND 8/15/22. CONTRACTOR ACCESS 8/15/22 AND BEYOND.

CONTRACTOR ACCESS STARTING 5/15/22

CONTRACTOR ACCESS STARTING 8/15/22

A1 FIRST LEVEL ACCESS PLAN

3/32" = 1'-0"

0 8' 16' 24'

PLAN NORTH

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LICENSED ARCHITECT ELIZABETH HUCKINS No. 4338 STATE OF MAINE
2/17/2022

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
B	ADDENDUM NO. 3	02-17-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	BEB

SHEET TITLE:
FIRST LEVEL ACCESS PLAN

SHEET ID:
GC101B

NOT FOR CONSTRUCTION

SITE ACCESS NOTES:

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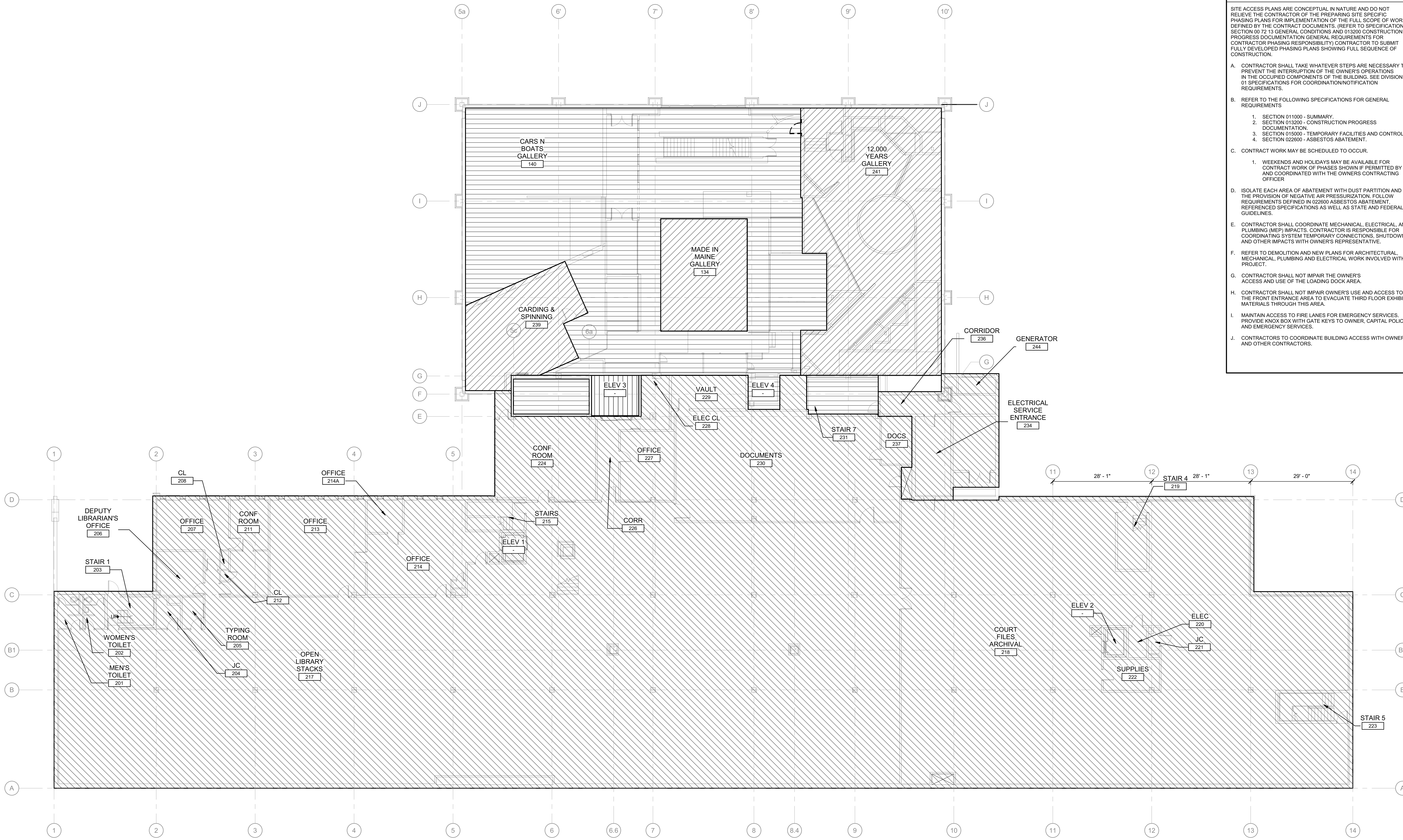

CONTRACTOR ACCESS STARTING UPON NOTICE TO PROCEED

CONTRACTOR ACCESS LIMITED TO ESCORT BY OWNER ONLY

CONTRACTOR ACCESS SHARED WITH OWNER BETWEEN NOTICE TO PROCEED AND 8/15/22. CONTRACTOR ACCESS 8/15/22 AND BEYOND.

CONTRACTOR ACCESS STARTING 5/15/22

CONTRACTOR ACCESS STARTING 8/15/22

A1 SECOND LEVEL ACCESS PLAN

3/32" = 1'-0"

0 8' 16' 24'

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LICENSED ARCHITECT
ELIZABETH HUCKINS
No. 4338
STATE OF MAINE

2/17/2022

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
B	ADDENDUM NO. 3	02-17-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	BEB

SHEET TITLE:
SECOND LEVEL ACCESS PLAN

SHEET ID:
GC102B

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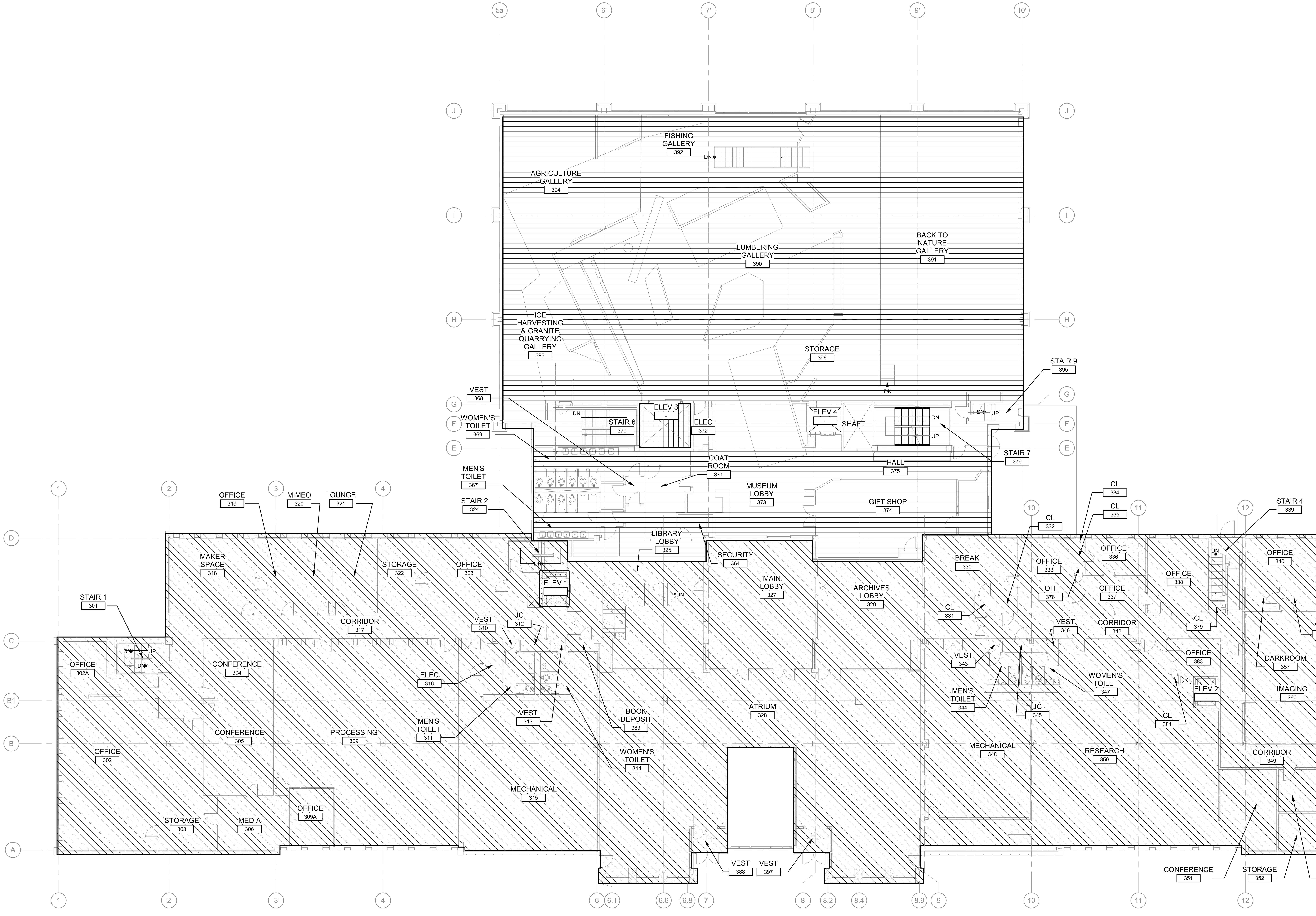

SITE ACCESS NOTES:

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B. REFER TO THE FOLLOWING SPECIFICATIONS FOR GENERAL REQUIREMENTS

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CONTRACTOR ACCESS STARTING 5/15/22

CONTRACTOR ACCESS STARTING 8/15/22

A1 THIRD LEVEL ACCESS PLAN

3/32" = 1'-0"

0 8' 16' 24'

PLAN NORTH

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LICENSED ARCHITECT ELIZABETH HUCKINS No. 4339 STATE OF MAINE
2/17/2022

CURRENT ISSUE STATUS: PHASE 2 - ISSUED FOR BID JANUARY 7, 2022

PROJECT: STATE OF MAINE CULTURAL BUILDING ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

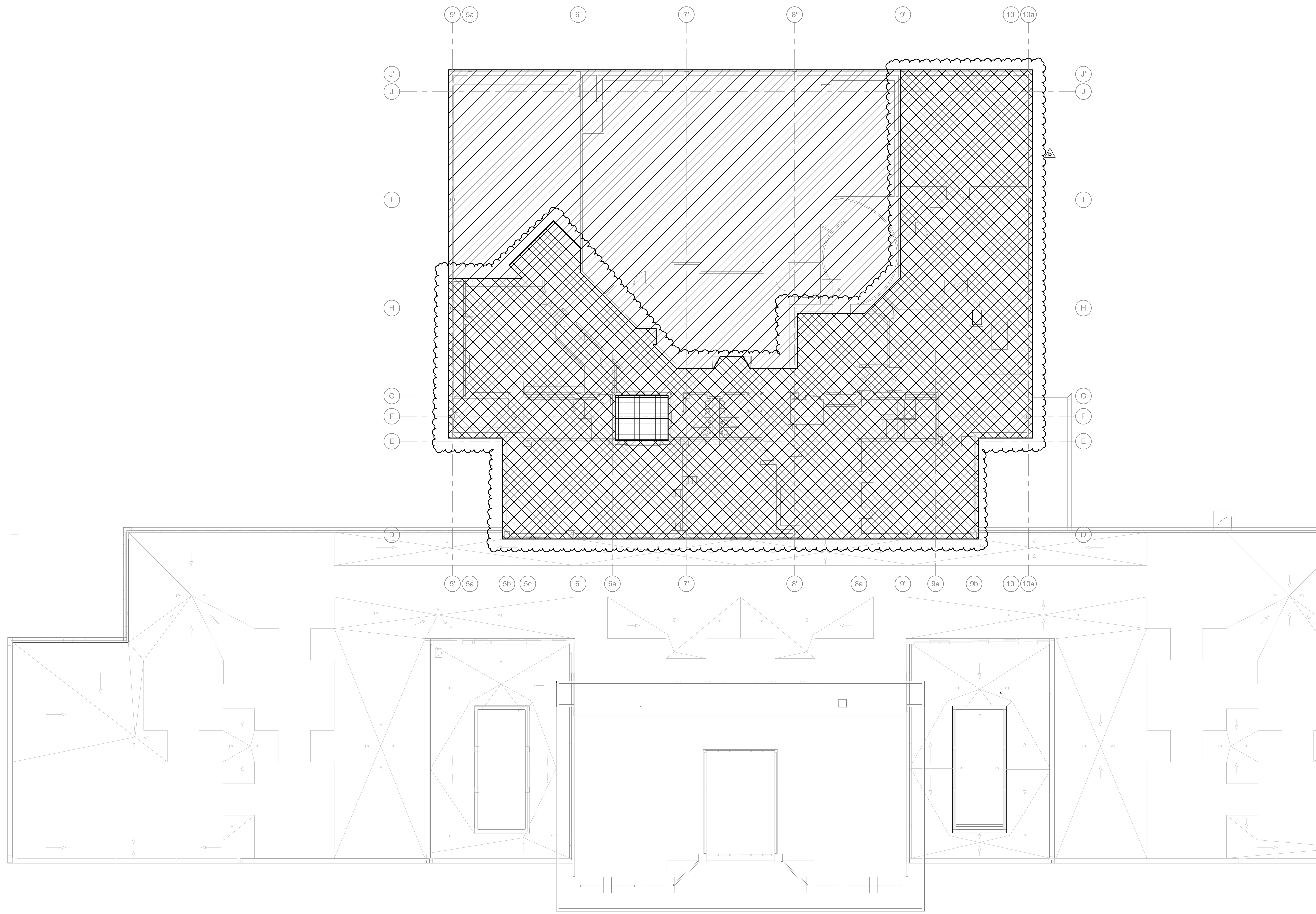
REV	REVISION ISSUE DESCRIPTION	DATE
B	ADDENDUM NO. 3	02-17-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	BEB

SHEET TITLE: THIRD LEVEL ACCESS PLAN

SHEET ID: GC103B

NOT FOR CONSTRUCTION



(hatch)	CONTRACTOR ACCESS STARTING UPON NOTICE TO PROCEED
(hatch)	CONTRACTOR ACCESS LIMITED TO ESCORT BY OWNER ONLY
(hatch)	CONTRACTOR ACCESS SHARED WITH OWNER BETWEEN NOTICE TO PROCEED AND 8/15/22. CONTRACTOR ACCESS 8/15/22 AND BEYOND.
(hatch)	CONTRACTOR ACCESS STARTING 5/15/22
(hatch)	CONTRACTOR ACCESS STARTING 8/15/22

A1 FOURTH LEVEL ACCESS PLAN

3/32" = 1'-0"

0 8' 16' 24'

PLAN NORTH

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   1. SECTION 011000 - SUMMARY.
   2. SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION.
   3. SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS.
   4. SECTION 022600 - ASBESTOS ABATEMENT.

C. CONTRACT WORK MAY BE SCHEDULED TO OCCUR.

   1. WEEKENDS AND HOLIDAYS MAY BE AVAILABLE FOR CONTRACT WORK OF PHASES SHOWN IF PERMITTED BY AND COORDINATED WITH THE OWNERS CONTRACTING OFFICER

D. ISOLATE EACH AREA OF ABATEMENT WITH DUST PARTITION AND THE PROVISION OF NEGATIVE AIR PRESSURIZATION. FOLLOW REQUIREMENTS DEFINED IN 022600 ASBESTOS ABATEMENT, REFERENCED SPECIFICATIONS AS WELL AS STATE AND FEDERAL GUIDELINES.

E. CONTRACTOR SHALL COORDINATE MECHANICAL, ELECTRICAL, AND PLUMBING (MEP) IMPACTS. CONTRACTOR IS RESPONSIBLE FOR COORDINATING SYSTEM TEMPORARY CONNECTIONS, SHUTDOWNS AND OTHER IMPACTS WITH OWNER'S REPRESENTATIVE.

F. REFER TO DEMOLITION AND NEW PLANS FOR ARCHITECTURAL, MECHANICAL, PLUMBING AND ELECTRICAL WORK INVOLVED WITH PROJECT.

G. CONTRACTOR SHALL NOT IMPAIR THE OWNER'S ACCESS AND USE OF THE LOADING DOCK AREA.

H. CONTRACTOR SHALL NOT IMPAIR OWNER'S USE AND ACCESS TO THE FRONT ENTRANCE AREA TO EVACUATE THIRD FLOOR EXHIBIT MATERIALS THROUGH THIS AREA.

I. MAINTAIN ACCESS TO FIRE LANES FOR EMERGENCY SERVICES. PROVIDE KNOX BOX WITH GATE KEYS TO OWNER, CAPITAL POLICE AND EMERGENCY SERVICES.

J. CONTRACTORS TO COORDINATE BUILDING ACCESS WITH OWNER AND OTHER CONTRACTORS.

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(207) 624-7314

LICENSED ARCHITECT
ELIZABETH HUCKINS
No. 4338
STATE OF MAINE
2/17/2022

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
B	ADDENDUM NO. 3	02-17-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	BEB

SHEET TITLE:
FOURTH LEVEL ACCESS PLAN

SHEET ID:
GC104B

NOT FOR CONSTRUCTION

SITE ACCESS NOTES:

SITE ACCESS PLANS ARE CONCEPTUAL IN NATURE AND DO NOT RELIEVE THE CONTRACTOR OF THE PREPARING SITE SPECIFIC PHASING PLANS FOR IMPLEMENTATION OF THE FULL SCOPE OF WORK DEFINED BY THE CONTRACT DOCUMENTS. (REFER TO SPECIFICATION SECTION 00 72 13 GENERAL CONDITIONS AND 013200 CONSTRUCTION PROGRESS DOCUMENTATION GENERAL REQUIREMENTS FOR CONTRACTOR PHASING RESPONSIBILITY) CONTRACTOR TO SUBMIT FULLY DEVELOPED PHASING PLANS SHOWING FULL SEQUENCE OF CONSTRUCTION.

A. CONTRACTOR SHALL TAKE WHATEVER STEPS ARE NECESSARY TO PREVENT THE INTERRUPTION OF THE OWNER'S OPERATIONS IN THE OCCUPIED COMPONENTS OF THE BUILDING. SEE DIVISION 01 SPECIFICATIONS FOR COORDINATION/NOTIFICATION REQUIREMENTS.

B. REFER TO THE FOLLOWING SPECIFICATIONS FOR GENERAL REQUIREMENTS

   1. SECTION 011000 - SUMMARY.
   2. SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION.
   3. SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS.
   4. SECTION 022600 - ASBESTOS ABATEMENT.

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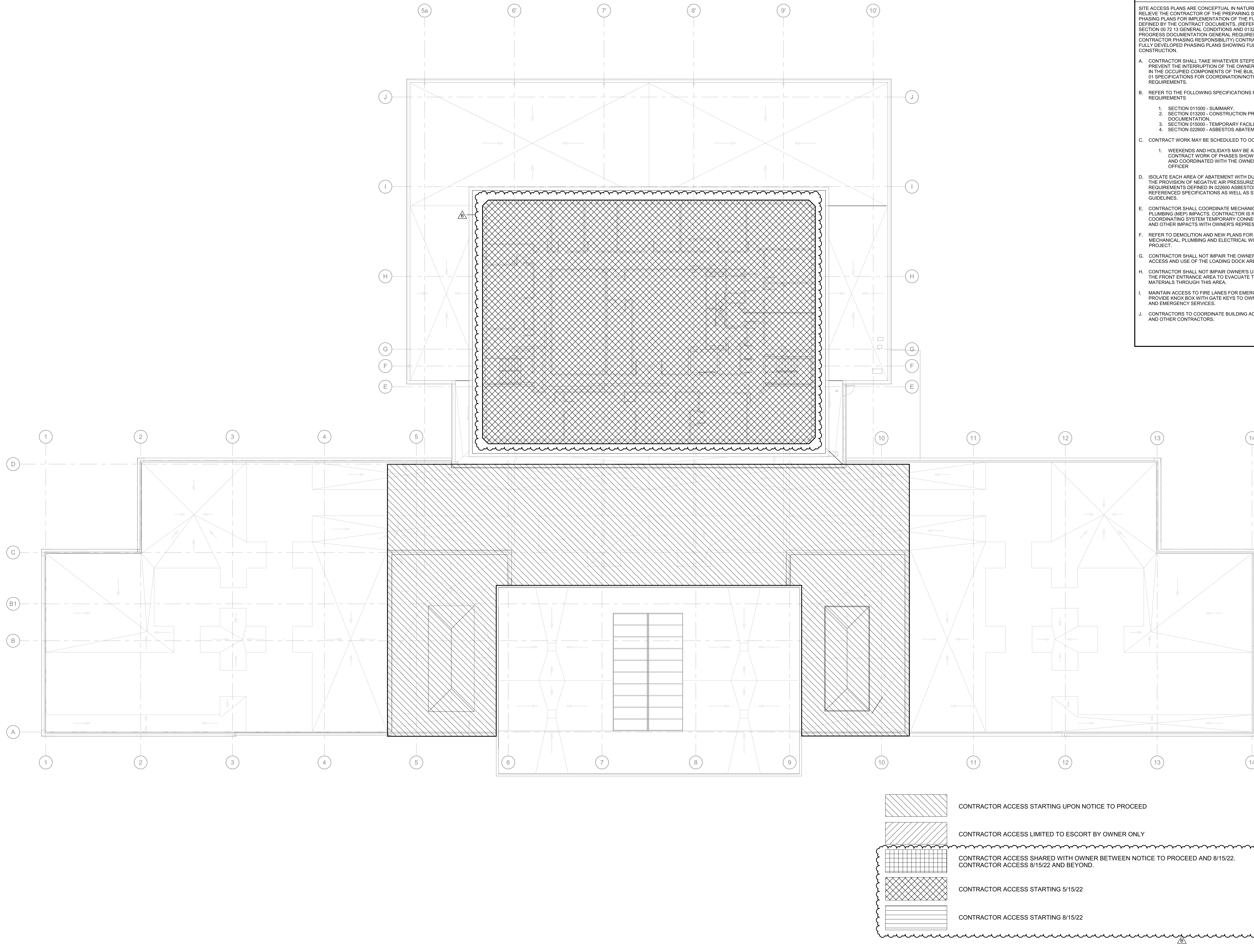
H. CONTRACTOR SHALL NOT IMPAIR OWNER'S USE AND ACCESS TO THE FRONT ENTRANCE AREA TO EVACUATE THIRD FLOOR EXHIBIT MATERIALS THROUGH THIS AREA.

I. MAINTAIN ACCESS TO FIRE LANES FOR EMERGENCY SERVICES. PROVIDE KNOX BOX WITH GATE KEYS TO OWNER, CAPITAL POLICE AND EMERGENCY SERVICES.

J. CONTRACTORS TO COORDINATE BUILDING ACCESS WITH OWNER AND OTHER CONTRACTORS.



A1 FIFTH LEVEL & ROOF ACCESS PLAN
3/32" = 1'-0"

0 8' 16' 24'

PLAN NORTH

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LICENSED ARCHITECT
ELIZABETH HUCKINS
No. 4338
STATE OF MAINE
2/17/2022

CURRENT ISSUE STATUS:
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JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

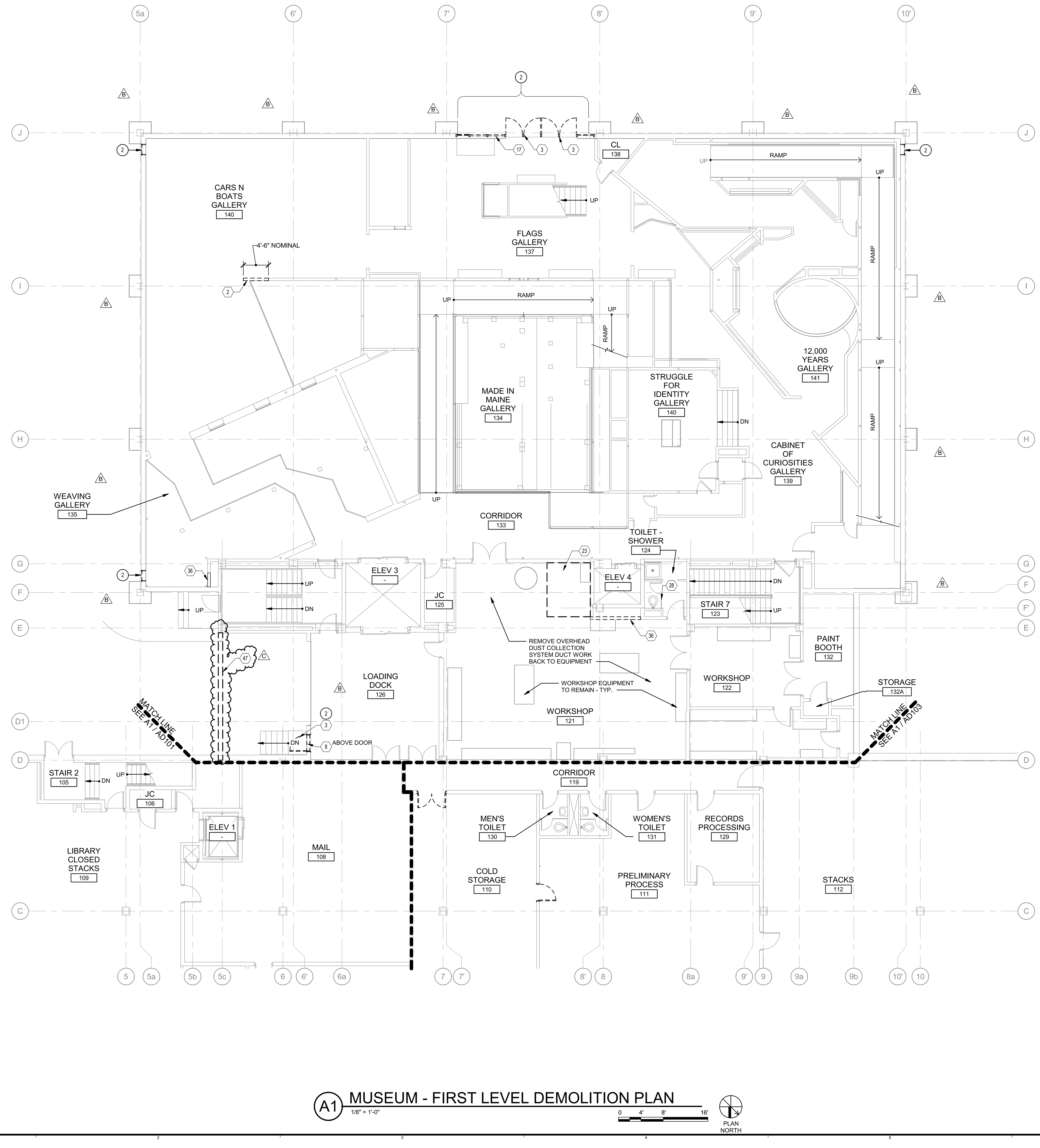
REV	REVISION ISSUE DESCRIPTION	DATE
B	ADDENDUM NO. 3	02-17-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	BEB

SHEET TITLE:
FIFTH LEVEL & ROOF ACCESS PLAN

SHEET ID:
GC105B

NOT FOR CONSTRUCTION



A1 MUSEUM - FIRST LEVEL DEMOLITION PLAN
1/8" = 1'-0"

NOTES

1. SEE SHEET A-001 FOR DEMOLITION GENERAL NOTES AND LEGEND
2. THE CONTRACTOR SHALL MAINTAIN THE EXISTING STRUCTURAL AND FIREPROOFING INTEGRITY OF THE ENTIRE BUILDING EXCEPT WHERE OTHERWISE NOTED.
3. UPON DISCOVERY OF HAZARDOUS MATERIALS ENCOUNTERED DURING CONSTRUCTION OTHER THAN THAT IDENTIFIED IN THE PROJECT SCOPE, NOTIFY THE DESIGNER AND OWNER IMMEDIATELY AND AWAIT FURTHER INSTRUCTIONS. THE WORK AREA SHALL BE COMPLETELY SEALED OFF DURING ABATEMENT.
4. WORK INCLUDED IN THE CONTRACT IS ILLUSTRATED IN BOLD DASHED LINE-WORK. EXISTING CONDITIONS TO REMAIN IS ILLUSTRATED IN LIGHT LINE-WORK. UNLESS NOTED OTHERWISE, BOLD-DASHED ITEMS INDICATED SUCH AS: PARTITIONS, DOORS, WINDOWS, EQUIPMENT, ETC. ARE TO BE REMOVED.
5. WHERE THE TERM "REMOVE" IS USED, THE CONTRACTOR SHALL REMOVE FROM THE SITE AND LEGALLY DISPOSE OF.
6. WHERE THE TERM "SALVAGE IS USED, THE CONTRACTOR SHALL REUSE THE EQUIPMENT ON THIS PROJECT OR RETURN TO THE OWNER. STORE SALVAGEABLE MATERIALS IN A LOCATION AS DIRECTED BY THE OWNER.
7. WHERE THE TERM "REMOVE AND REINSTALL" IS USED, THE CONTRACTOR IS TO DETACH ITEMS FROM EXISTING CONSTRUCTION, PREPARE THEM FOR REUSE, AND REINSTALL THEM WHERE INDICATED.
8. WHERE THE TERM "EXISTING TO REMAIN" IS USED, THE EXISTING ITEMS OF CONSTRUCTION ARE NOT TO BE REMOVED.
9. SEE HAZ-MAT REFLECTED CEILING DEMOLITION PLANS (HD1XXX) FOR CEILING DEMOLITION WORK.
10. SEE ENGINEERING DRAWINGS FOR THE REMOVAL OF SPECIFIC STRUCTURAL, MECHANICAL, ELECTRICAL, PLUMBING AND FIRE ALARM SYSTEMS.
11. REINSTALLED EQUIPMENT AND DEVICES ARE TO BE CLEANED OF ALL FOREIGN MATERIAL. REPLACE EQUIPMENT OR DEVICES WHICH ARE DEFECTIVE OR DAMAGED DURING RELOCATION.
12. WHEREVER MECHANICAL, ELECTRICAL, AND PLUMBING DEVICES ARE REMOVED, ALL PIPING AND/OR CONDUITS THAT ARE ABANDONED SHALL BE CAPPED OFF BELOW THE FLOOR, INSIDE THE WALLS, OR ABOVE THE CEILINGS EXCEPT WHERE NOTED OTHERWISE. MECHANICAL/ELECTRICAL CONTRACTOR TO REMOVE ALL UNUSED WIRING TO PANEL BOXES. PATCH AND REPAIR FINISHES TO MATCH SURROUNDING FINISHES.
13. REMOVE WALL BASE IN AREAS WHERE FLOORING IS BEING REMOVED.
14. FLOORS AND WALLS: WHERE WALLS OR PARTITIONS THAT ARE REMOVED EXTEND ONE FINISHED AREA INTO ANOTHER, PATCH AND REPAIR FLOOR AND WALL SURFACES IN THE NEW SPACE TO PROVIDE AN EVEN SURFACE OF UNIFORM FINISH, COLOR, TEXTURE, AND APPEARANCE.
15. PATCH FLOOR/FINISH AT LOCATIONS WHERE RADIATOR PIPING HAS BEEN REMOVED.

KEYED NOTES

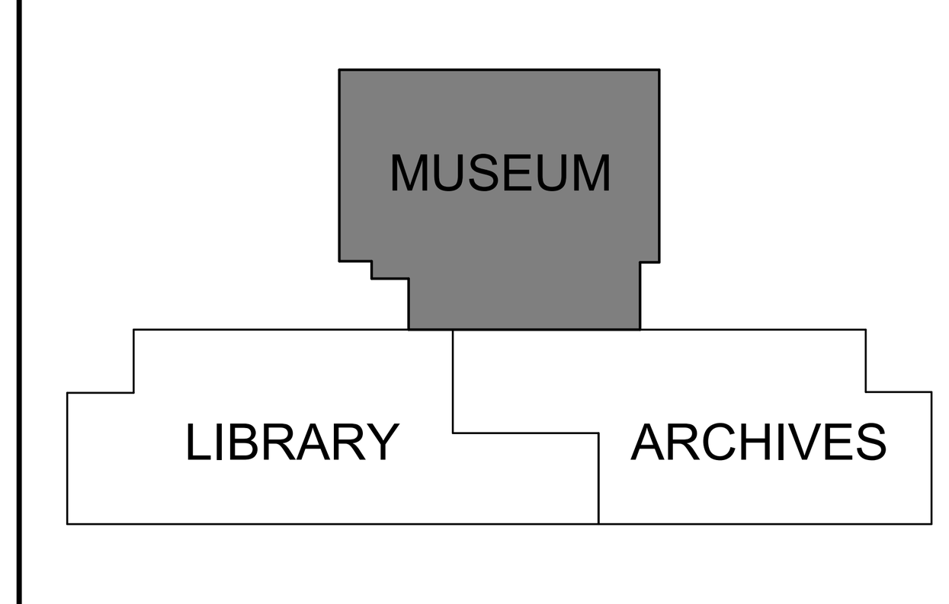
2	REMOVE PORTION OF WALL
3	REMOVE DOOR, FRAME, AND HARDWARE
8	REMOVE EXISTING LOUVER AND EXISTING SCREEN, WHERE OCCURS
17	REMOVE FRAMED GLAZING SYSTEM. REMOVE GWB AND FRAMING AT SPANDREL LOCATION
23	REMOVE LUMBER RACK
28	TEMPORARILY SUPPORT TOILET COMPARTMENTS FOR ABATEMENT ACTIVITY.
36	REMOVE PORTION OF WALL AS REQUIRED FOR ACCESS TO MECHANICAL DUCTS AND PIPING
47	REMOVE RIGID INSULATION AT STEEL FRAMING.

ADDITIVE BID ALTS

SEE SHEET GI004B FOR FURTHER BID ALTERNATE INFORMATION

2. BID ALTERNATE 2: REPLACE EXTERIOR DOORS, WINDOWS AND GLAZING SYSTEMS

KEY PLAN



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LICENSED ARCHITECT ELIZABETH HUCKINS No. 4338 STATE OF MAINE
2/17/2022

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
C	ADDENDUM NO. 3	02-17-2022
B	ADDENDUM NO. 2	02-08-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	JLR

SHEET TITLE:
MUSEUM - FIRST LEVEL DEMOLITION PLAN

SHEET ID:
AD105

NOT FOR CONSTRUCTION

NOTES

1. SEE SHEET A-001 FOR DEMOLITION GENERAL NOTES AND LEGEND
2. THE CONTRACTOR SHALL MAINTAIN THE EXISTING STRUCTURAL AND FIREPROOFING INTEGRITY OF THE ENTIRE BUILDING EXCEPT WHERE OTHERWISE NOTED.
3. UPON DISCOVERY OF HAZARDOUS MATERIALS ENCOUNTERED DURING CONSTRUCTION OTHER THAN THAT IDENTIFIED IN THE PROJECT SCOPE, NOTIFY THE DESIGNER AND OWNER IMMEDIATELY AND AWAIT FURTHER INSTRUCTIONS. THE WORK AREA SHALL BE COMPLETELY SEALED OFF DURING ABATEMENT.
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8. WHERE THE TERM "EXISTING TO REMAIN" IS USED, THE EXISTING ITEMS OF CONSTRUCTION ARE NOT TO BE REMOVED.
9. SEE HAZ-MAT REFLECTED CEILING DEMOLITION PLANS (HD1XXX) FOR CEILING DEMOLITION WORK.
10. SEE ENGINEERING DRAWINGS FOR THE REMOVAL OF SPECIFIC STRUCTURAL, MECHANICAL, ELECTRICAL, PLUMBING AND FIRE ALARM SYSTEMS.
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15. PATCH FLOOR/FINISH AT LOCATIONS WHERE RADIATOR PIPING HAS BEEN REMOVED.

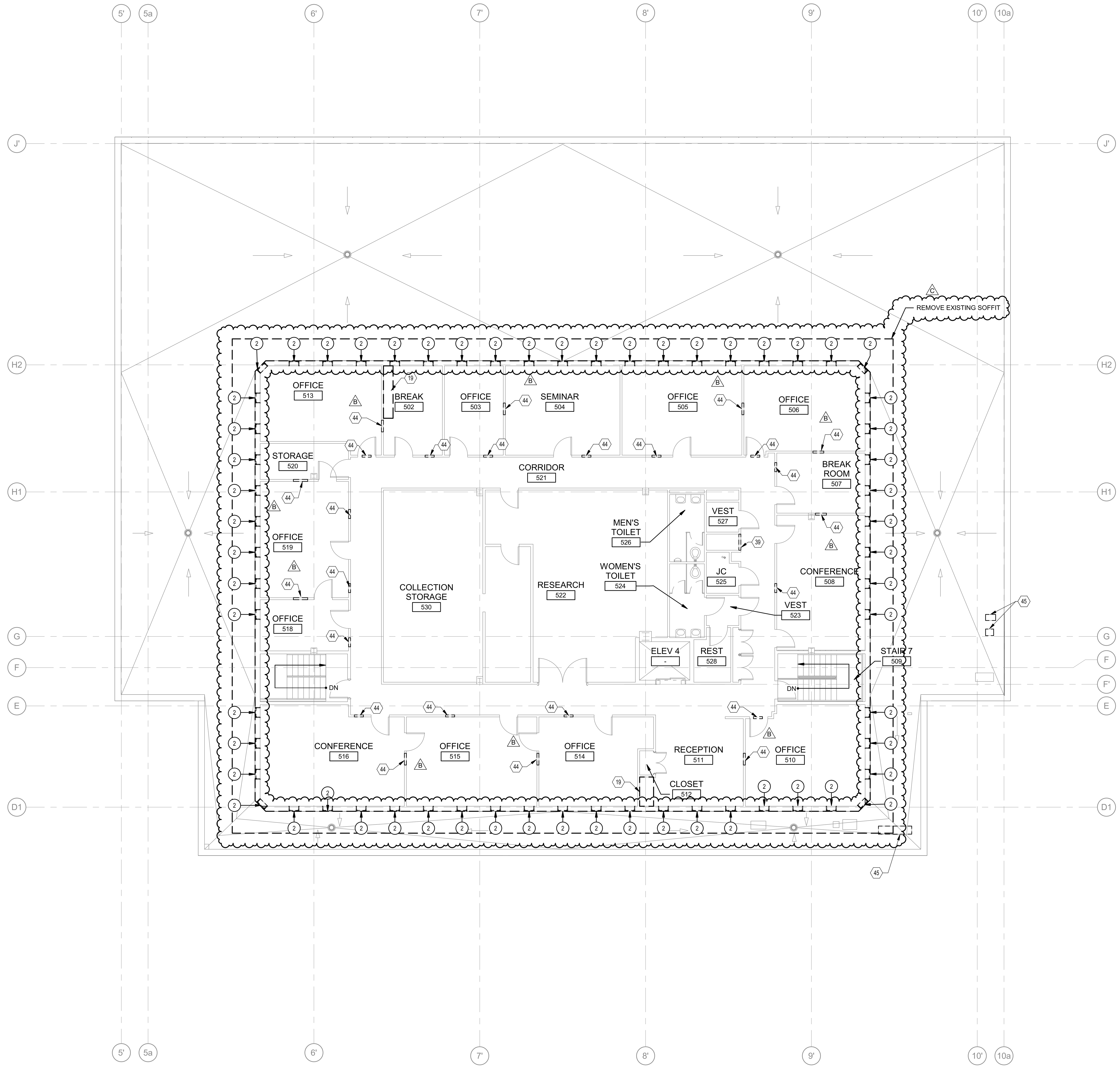
KEYED NOTES

19	REMOVE & SALVAGE CASEWORK AND COUNTERTOP. PROTECT DURING CONSTRUCTION UNTIL RE-INSTALLED
39	REMOVE ACCESS DOOR TO CHASE
44	REMOVE PORTION OF WALL ABOVE LINE OF CEILING FOR MECHANICAL SYSTEM AIR TRANSFER, APPROX. 1 SF, OR 1 CMU BLOCK WHERE OCCURS
45	REMOVE EXISTING MECHANICAL EQUIPMENT AND CURB FLUSH TO ROOF DECK. SEE MECHANICAL DRAWINGS.

ADDITIVE BID ALTS

SEE SHEET GI004B FOR FURTHER BID ALTERNATE INFORMATION

2. BID ALTERNATE 2:
REPLACE EXTERIOR DOORS, WINDOWS AND GLAZING SYSTEMS

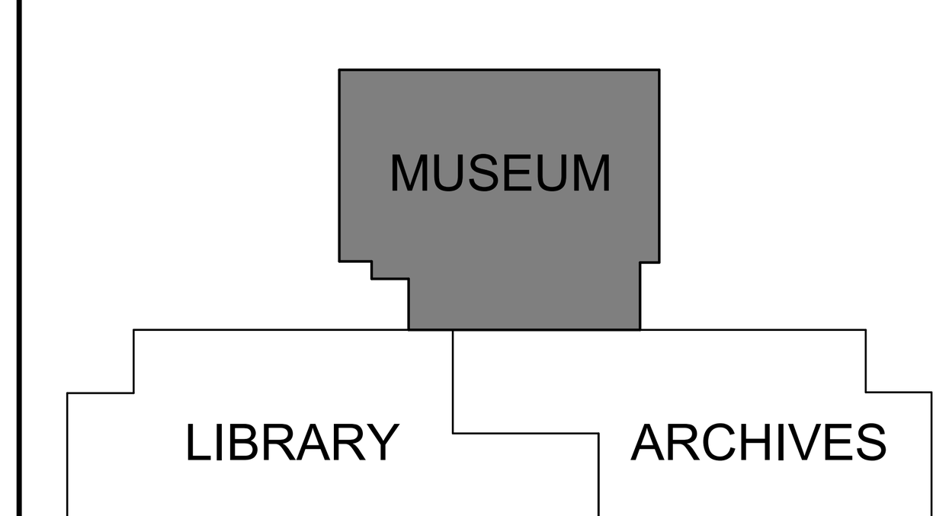


A1 MUSEUM - FIFTH LEVEL DEMOLITION FLOOR PLAN

1/8" = 1'-0"

PLAN NORTH

KEY PLAN



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LICENSED ARCHITECT ELIZABETH HUCKINS No. 4338 STATE OF MAINE
2/17/2022

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

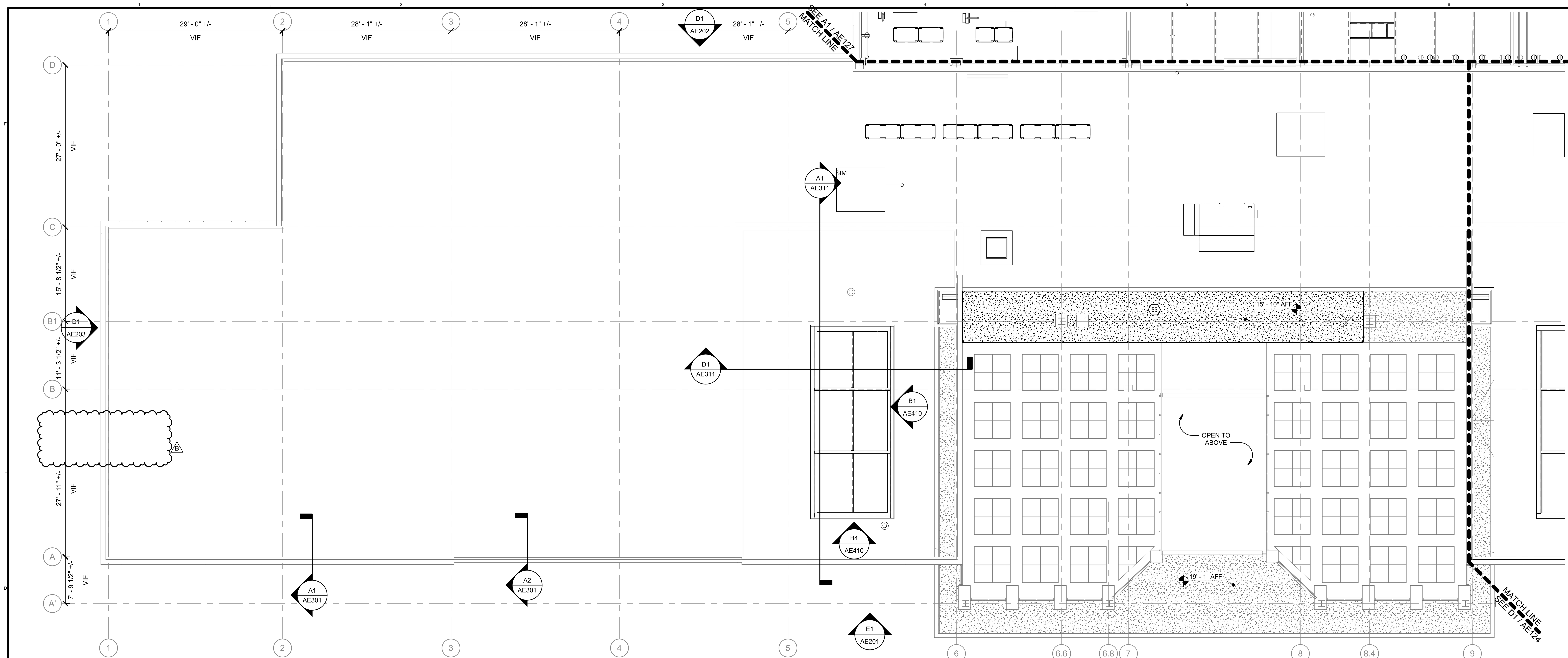
REV	REVISION ISSUE DESCRIPTION	DATE
C	ADDENDUM NO. 3	02-17-2022
B	ADDENDUM NO. 2	02-08-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	JLR

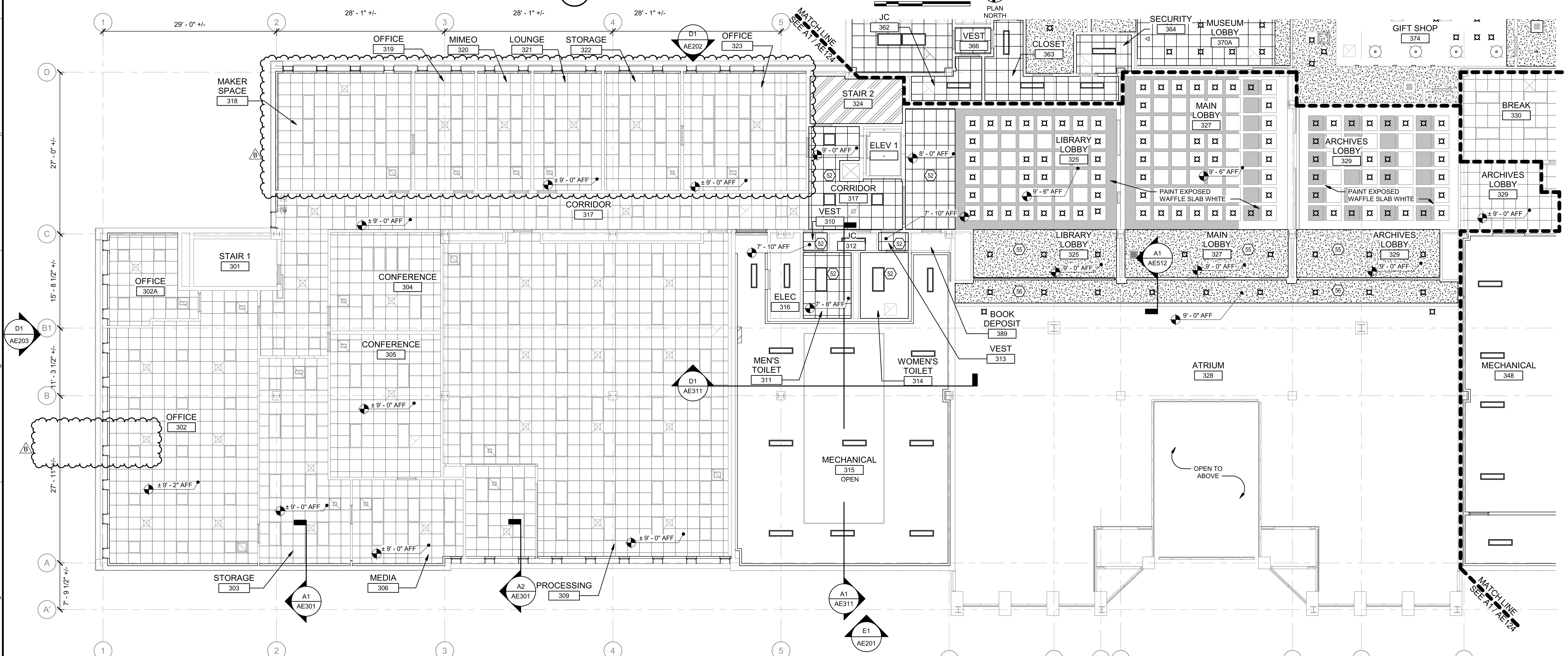
SHEET TITLE:
MUSEUM - FIFTH LEVEL DEMOLITION PLAN

SHEET ID:
AD109

NOT FOR CONSTRUCTION



D1 LIBRARY - ATRIUM LEVEL CEILING PLAN
1/8" = 1'-0"
PLAN NORTH



A1 LIBRARY - THIRD LEVEL CEILING PLAN
1/8" = 1'-0"
PLAN NORTH

NOTES

1. SEE SHEET A-001 FOR SYMBOLS, LEGENDS AND GENERAL NOTES
2. CENTER CEILING GRID IN SPACE UNLESS NOTED OTHERWISE
3. CENTER NEW EQUIPMENT AND DEVICES IN CEILING TILE UNLESS NOTED OTHERWISE
4. REINSTALL SUSPENDED CEILING TILE REMOVED FOR INSULATION UPGRADES, MECHANICAL, ELECTRICAL, AND TELECOMMUNICATIONS WORK. IF TILES OR CEILING SYSTEM ARE DAMAGED DURING WORK, REPLACE IN KIND.
5. COORDINATE WITH MECHANICAL AND ELECTRICAL REQUIREMENTS FOR LOCATION OF ACCESS PANELS. LOCATIONS SHALL BE REVIEWED AND APPROVED BY THE OWNER.
8. CEILING HEIGHT SHALL BE 9'-0" AFF UNO.
9. "OPEN" REFERS TO OPEN TO STRUCTURE ABOVE.
10. IN AREAS NOTED TO PAINT EXPOSED STRUCTURE OVERHEAD, PAINT STRUCTURE, EQUIPMENT AND FIREPROOFING WHERE OCCURS.

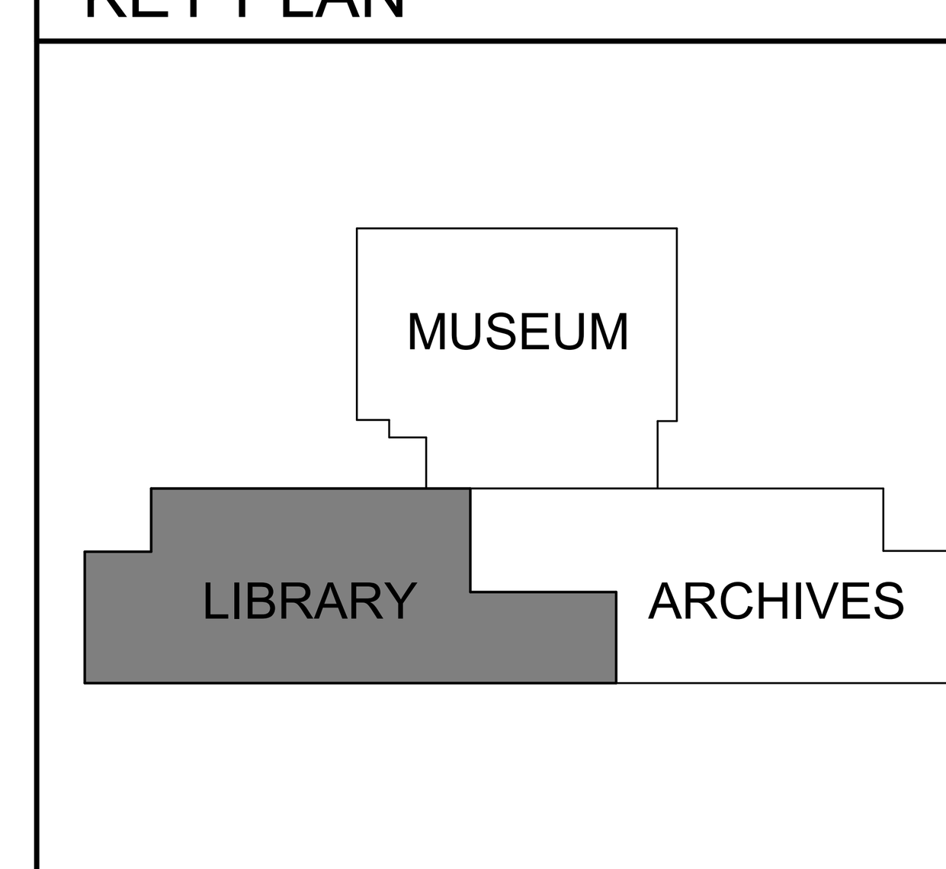
KEYED NOTES

52 2' X 2' SUSPENDED ACOUSTIC PANEL CEILING SYSTEM, FACTORY WHITE UNO

55 SUSPENDED METAL FRAMED CEILING WITH 5/8" GYPSUM BOARD FINISH, PAINTED

56 METAL FRAMED SOFFIT WITH 5/8" GYPSUM BOARD FINISH, PAINTED

KEY PLAN



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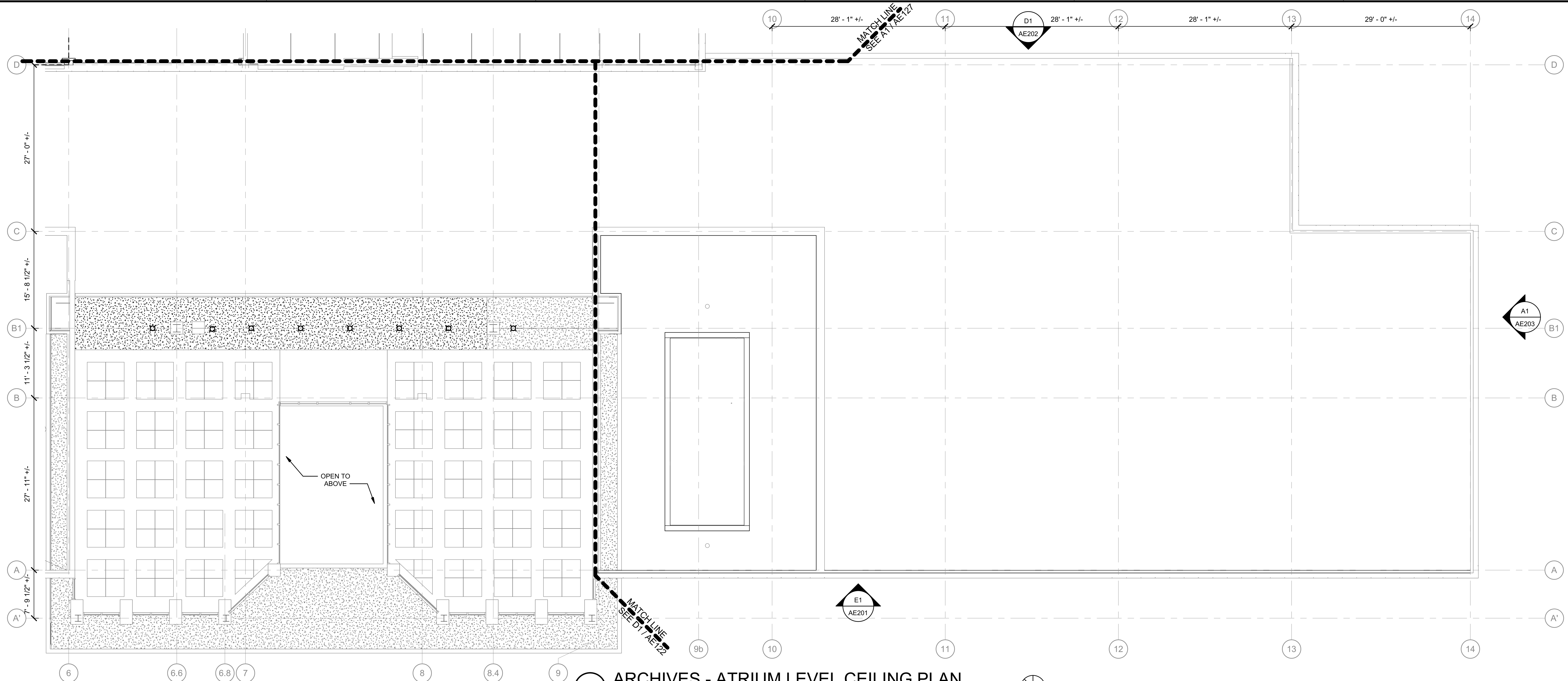
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	JLR

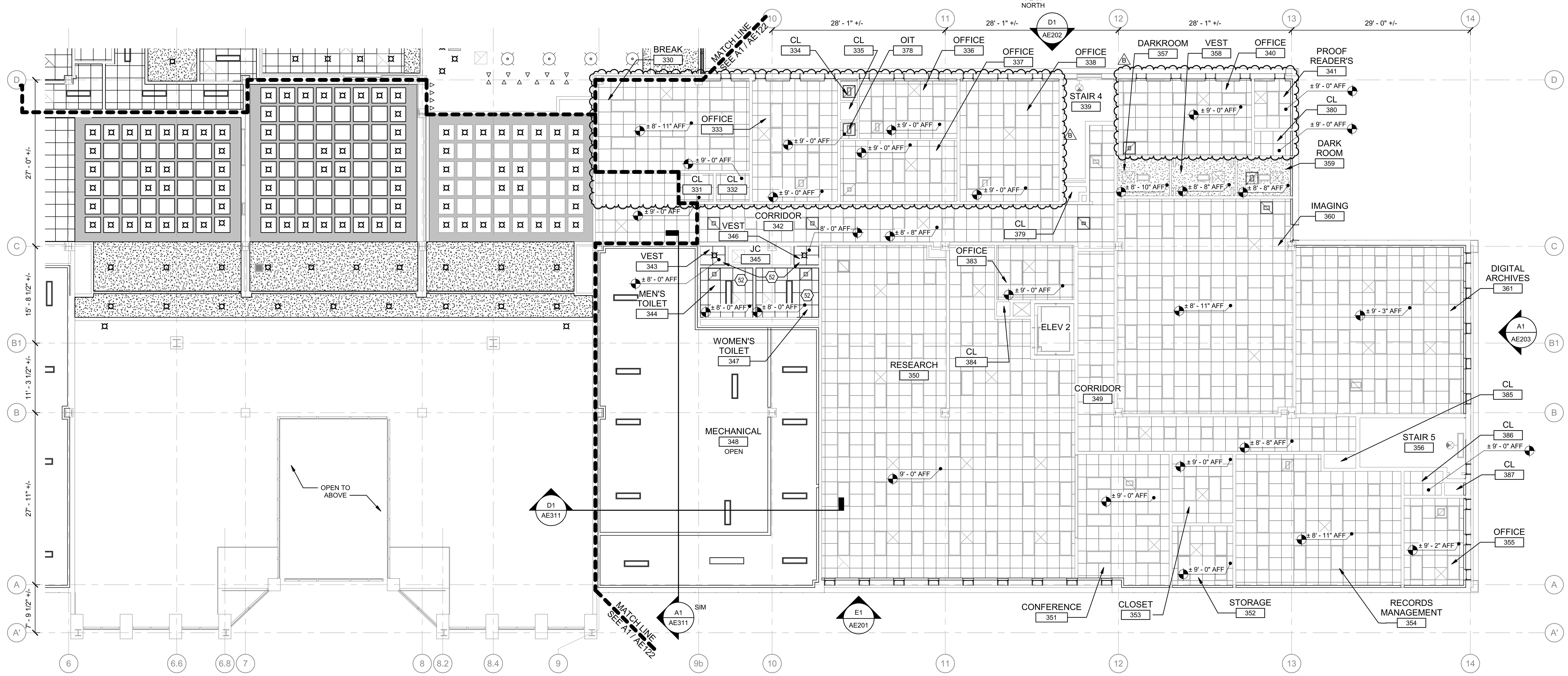
SHEET TITLE:
LIBRARY - THIRD AND ATRIUM LEVEL REFLECTED CEILING PLANS

SHEET ID:
AE122

NOT FOR CONSTRUCTION



D1 ARCHIVES - ATRIUM LEVEL CEILING PLAN
1/8" = 1'-0"



A1 ARCHIVES - THIRD LEVEL CEILING PLAN
1/8" = 1'-0"

NOTES

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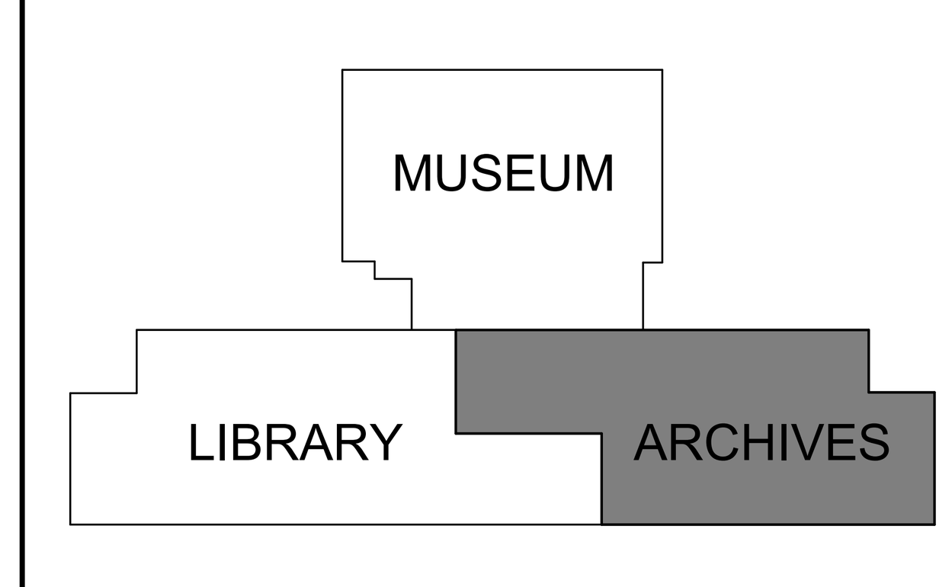
9. "OPEN" REFERS TO OPEN TO STRUCTURE ABOVE.
10. IN AREAS NOTED TO PAINT EXPOSED STRUCTURE OVERHEAD, PAINT STRUCTURE, EQUIPMENT AND FIREPROOFING WHERE OCCURS.

KEYED NOTES

52 2' X 2' SUSPENDED ACOUSTIC PANEL CEILING SYSTEM, FACTORY WHITE UNO

KEY PLAN



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A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	JLR

SHEET TITLE:
ARCHIVES - THIRD AND ATRIUM LEVEL REFLECTED CEILING PLANS

SHEET ID:
AE124

NOT FOR CONSTRUCTION

NOTES

1. SEE SHEET A-001 FOR SYMBOLS, LEGENDS AND GENERAL NOTES
2. CENTER CEILING GRID IN SPACE UNLESS NOTED OTHERWISE
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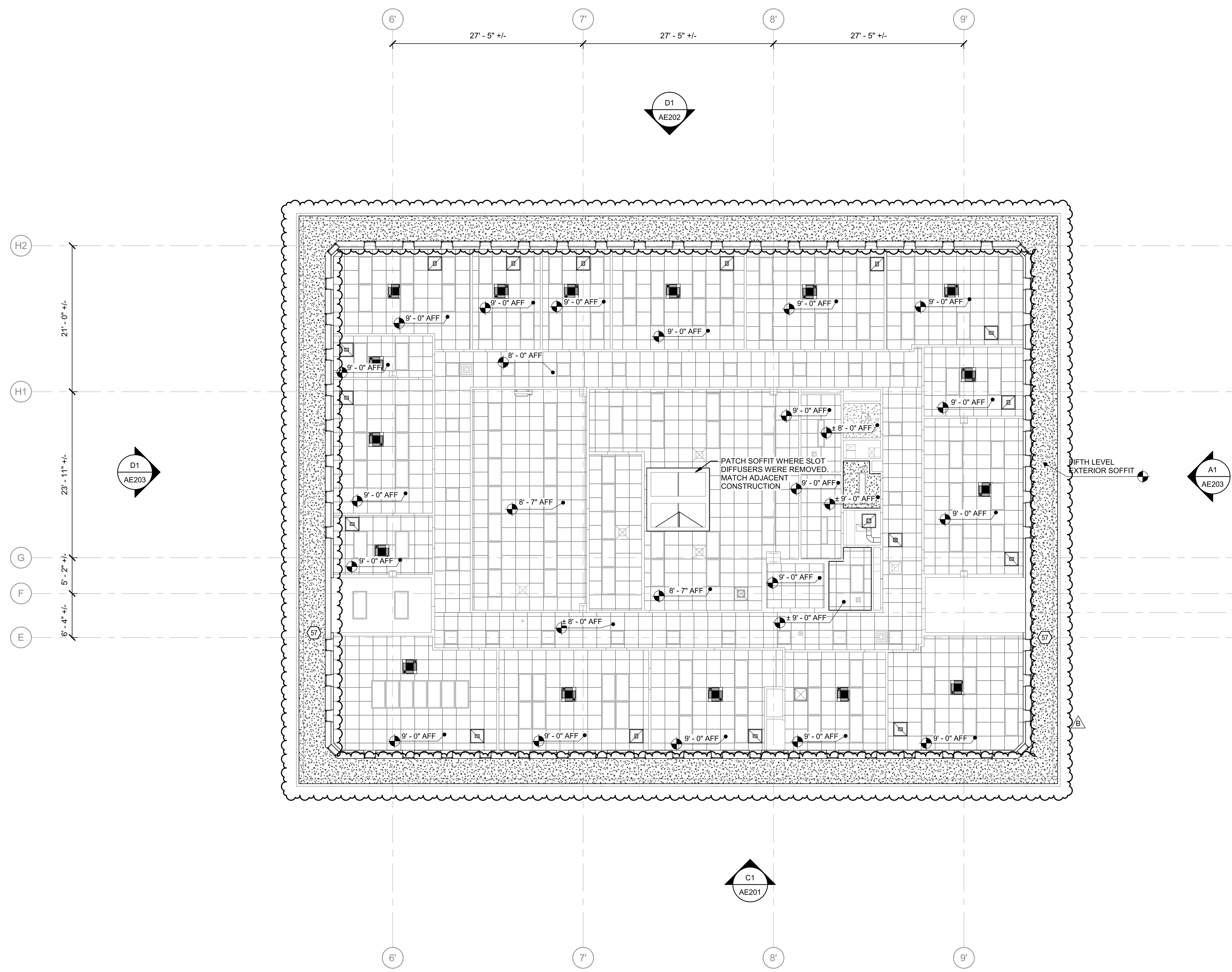
8. CEILING HEIGHT SHALL BE 9'-0" AFF UNO.
9. "OPEN" REFERS TO OPEN TO STRUCTURE ABOVE.
10. IN AREAS NOTED TO PAINT EXPOSED STRUCTURE OVERHEAD, PAINT STRUCTURE, EQUIPMENT AND FIREPROOFING WHERE OCCURS.

KEYED NOTES

57 METAL FRAMED SOFFIT WITH 5/8" EXTERIOR - GRADE GYPSUM BOARD FINISH, PAINTED



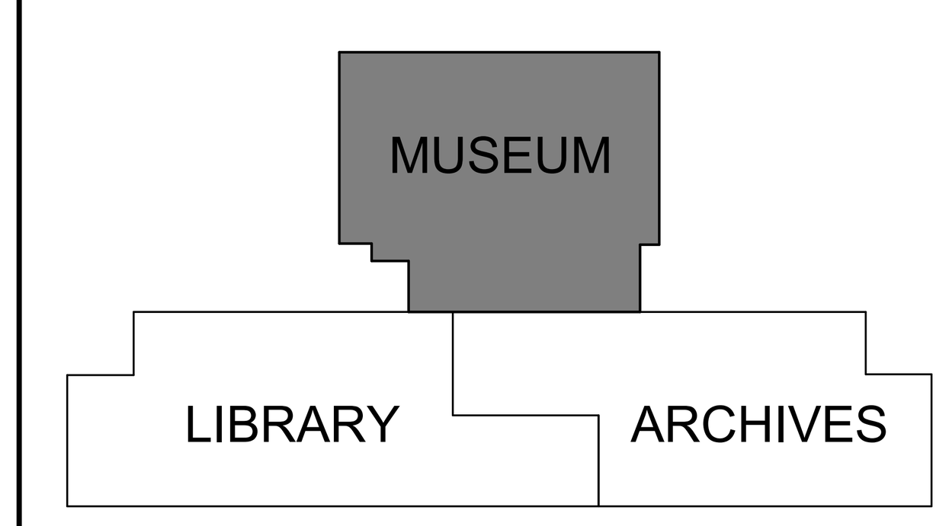
A1 MUSEUM - FIFTH LEVEL REFLECTED CEILING PLAN

1/8" = 1'-0"

0 4' 8' 16'

PLAN NORTH

KEY PLAN



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(207) 624-7314

LICENSED ARCHITECT ELIZABETH HUCKINS No. 4338 STATE OF MAINE
2/17/2022

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

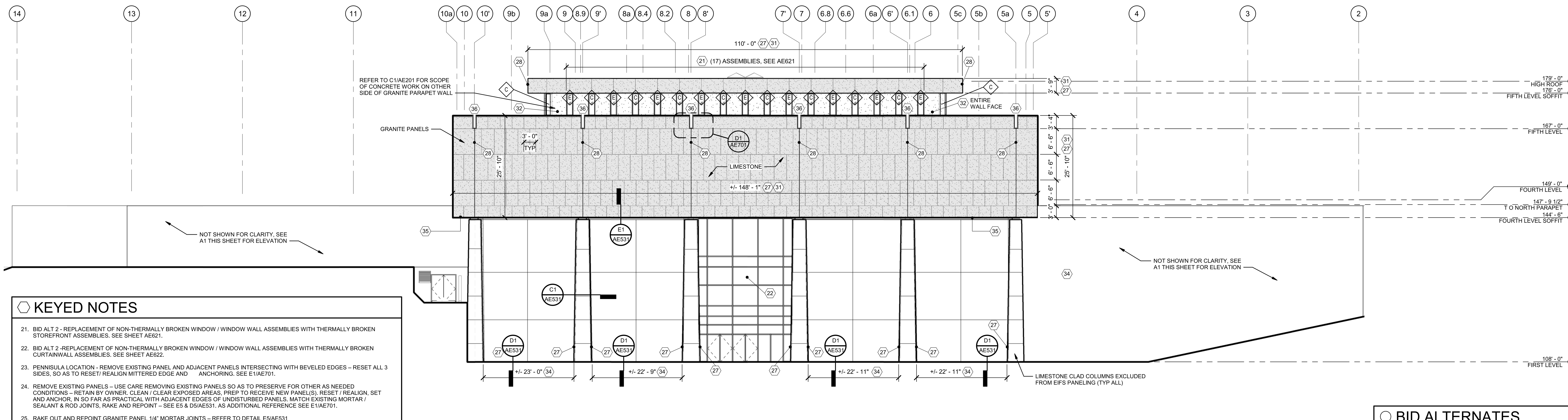
REV	REVISION ISSUE DESCRIPTION	DATE
B	ADDENDUM NO. 3	02-17-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	JLR

SHEET TITLE:
MUSEUM - FIFTH LEVEL REFLECTED CEILING PLAN

SHEET ID:
AE129

NOT FOR CONSTRUCTION



D1 SOUTH ELEVATION - MUSEUM
3/32" = 1'-0"

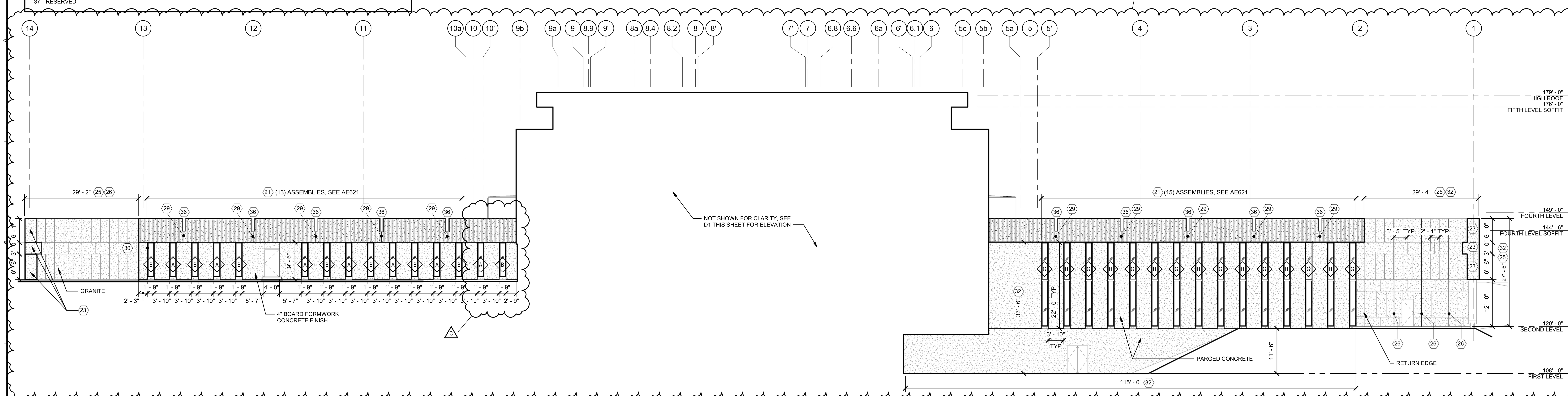
KEYED NOTES

21. BID ALT 2 - REPLACEMENT OF NON-THERMALLY BROKEN WINDOW / WINDOW WALL ASSEMBLIES WITH THERMALLY BROKEN STOREFRONT ASSEMBLIES. SEE SHEET AE621.
22. BID ALT 2 -REPLACEMENT OF NON-THERMALLY BROKEN WINDOW / WINDOW WALL ASSEMBLIES WITH THERMALLY BROKEN CURTAINWALL ASSEMBLIES. SEE SHEET AE622.
23. PENNISULA LOCATION - REMOVE EXISTING PANEL AND ADJACENT PANELS INTERSECTING WITH BEVELED EDGES – RESET ALL 3 SIDES, SO AS TO RESET/ REALIGN MITTERED EDGE AND ANCHORING. SEE E1/AE701.
24. REMOVE EXISTING PANELS – USE CARE REMOVING EXISTING PANELS SO AS TO PRESERVE FOR OTHER AS NEEDED CONDITIONS – RETAIN BY OWNER. CLEAN / CLEAR EXPOSED AREAS, PREP TO RECEIVE NEW PANEL(S). RESET / REALIGN, SET AND ANCHOR, IN SO FAR AS PRACTICAL WITH ADJACENT EDGES OF UNDISTURBED PANELS. MATCH EXISTING MORTAR / SEALANT & ROD JOINTS, RAKE AND REPOINT – SEE E5 & D5/AE531. AS ADDITIONAL REFERENCE SEE E1/AE701.
25. RAKE OUT AND REPOINT GRANITE PANEL 1/4” MORTAR JOINTS – REFER TO DETAIL E5/AE531
26. RAKE OUT AND REPOINT GRANITE PANEL 3/4” ROD AND SEALANT JOINTS – SEE F5/AE531
27. RAKE OUT AND REPOINT LIMESTONE PANEL 1/4” MORTAR JOINTS – SEE E5/AE351
28. RAKE OUT AND REPOINT LIMESTONE PANEL 3/4” ROD AND SEALANT JOINTS – SEE F5/AE531
29. RAKE OUT AND REPOINT CONCRETE PANEL ROD AND SEALANT JOINTS – SEE D5/AE531
30. RAKE OUT AND REPOINT SURFACE MATERIAL TRANSITIONS (REFER TO GENERAL NOTE #5 AND PHOTO DETAIL # E1/AE701)
31. CLEAN LIMESTONE PANELS, IN SO FAR AS PRACTICAL AND CARE, REMOVE ANY AND ALL STAINING.
32. PATCH AND REPAIR CRACKED AND DAMAGED CEMENTITIOUS COATING ON CONCRETE SURFACES - PAINT FINISH
33. REMOVE DAMAGED PANEL – REPLACE WITH NEW PANEL – SET / MATCH ALIGN WITH EXISTING AND REPOINT.
34. NEW EIFS WALL SYSTEM – SEE ELEVATIONS FOR CONTROL JOINTS
35. NEW SOFFIT – MATCH EXISTING COLOR/TEXTURE AND JOINERY – SEE WALL SECTION A4/AE301.
36. RAKE AND REPOINT ROD AND SEALANT JOINTS AT SCUPPERS – SEE B1/AE531
37. RESERVED

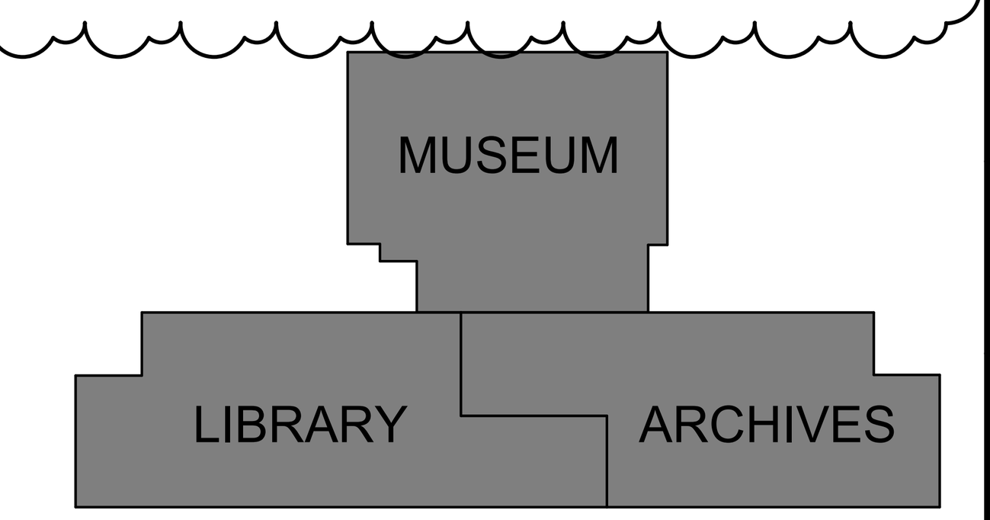
BID ALTERNATES

SEE SHEET GI004B FOR FURTHER BID ALTERNATE INFORMATION

2. BID ALTERNATE 2: REPLACE EXTERIOR FENESTRATION
3. BID ALTERNATE 3: HARD SURFACE REPAIR : LIMESTONE, CONCRETE, GRANITE
4. BID ALTERNATE 4: HARD SURFACE CLEANING : LIMESTONE, CONCRETE, GRANITE



A1 SOUTH ELEVATION LIBRARY & ARCHIVES
3/32" = 1'-0"



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LICENSED ARCHITECT DANIEL C. MORENO No. 2409 STATE OF MAINE
02/17/2022

CURRENT ISSUE STATUS:
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JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
C	ADDENDUM NO. 3	02-17-2022
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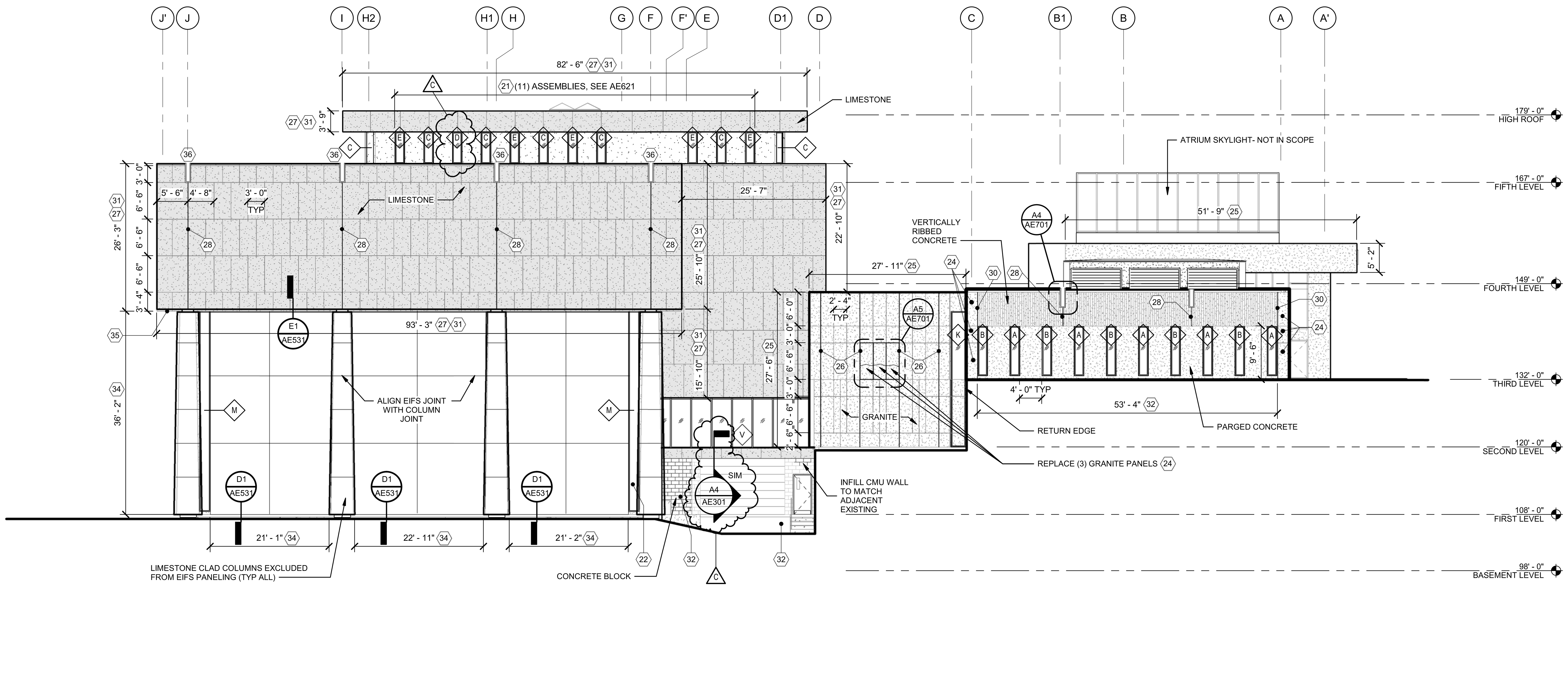
PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	DCM
DESIGNED BY:	PDG
DRAWN BY:	GJN

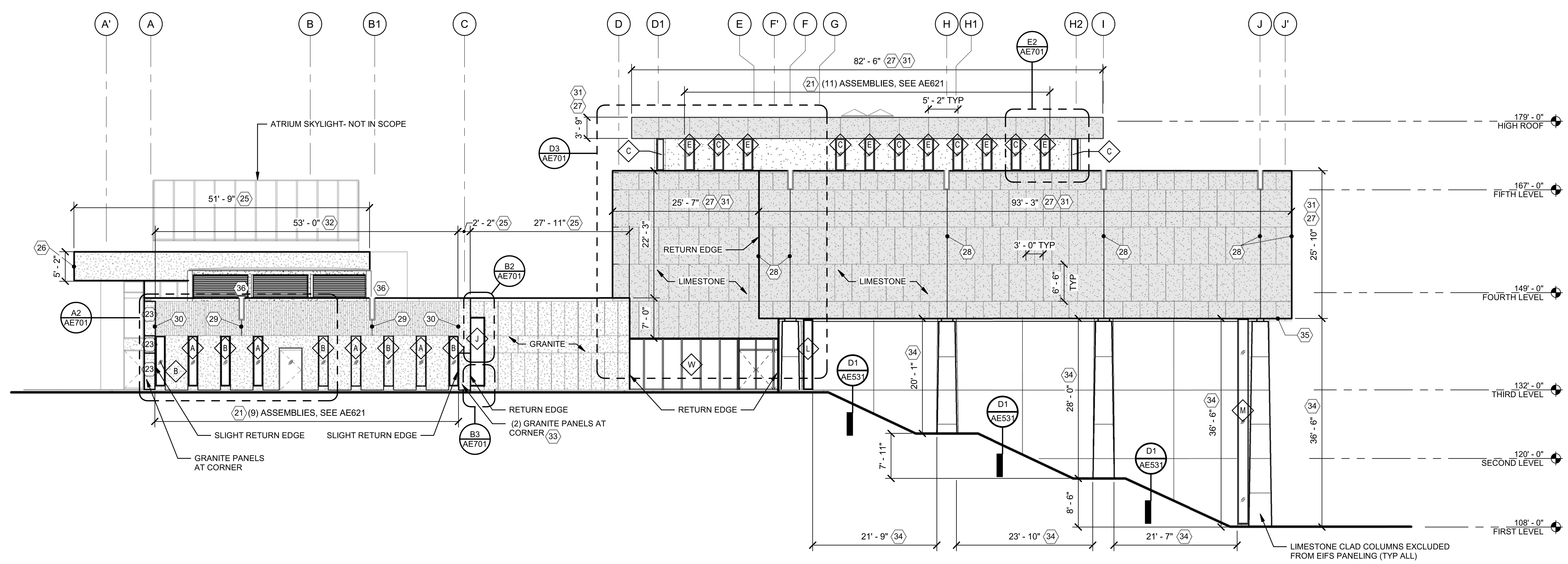
SHEET TITLE:
EXTERIOR ELEVATIONS

SHEET ID:
AE202

NOT FOR CONSTRUCTION



D1 EAST ELEVATION
3/32" = 1'-0"



A1 WEST ELEVATION
3/32" = 1'-0"

NOTES

KEYED NOTES

21. BID ALT 2 - REPLACEMENT OF NON-THERMALLY BROKEN WINDOW / WINDOW WALL ASSEMBLIES WITH THERMALLY BROKEN STOREFRONT ASSEMBLIES. SEE SHEET AE621.
22. BID ALT 2 -REPLACEMENT OF NON-THERMALLY BROKEN WINDOW / WINDOW WALL ASSEMBLIES WITH THERMALLY BROKEN CURTAINWALL ASSEMBLIES. SEE SHEET AE622.
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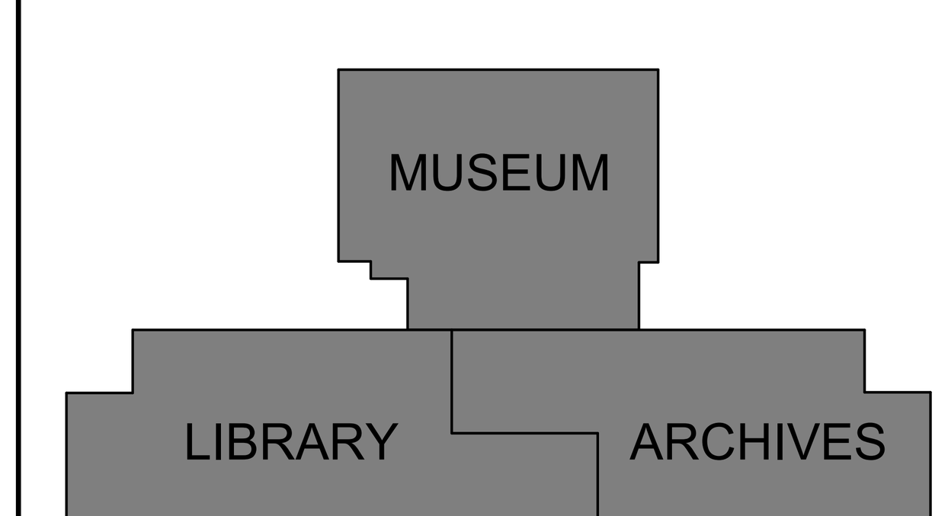
35. NEW SOFFIT – MATCH EXISTING COLOR/TEXTURE AND JOINERY – SEE WALL SECTION A4/AE301.
36. RAKE AND REPOINT ROD AND SEALANT JOINTS AT SCUPPERS – SEE B1/AE531
37. RESERVED

BID ALTERNATES

SEE SHEET GI004B FOR FURTHER BID ALTERNATE INFORMATION

2. BID ALTERNATE 2:
REPLACE EXTERIOR FENESTRATION
3. BID ALTERNATE 3:
HARD SURFACE REPAIR : LIMESTONE, CONCRETE, GRANITE
4. BID ALTERNATE 4:
HARD SURFACE CLEANING : LIMESTONE, CONCRETE, GRANITE



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LICENSED ARCHITECT
DANIEL C. MORENO
No. 2409
STATE OF MAINE
Daniel C Moreno 02/17/2022

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
C	ADDENDUM NO. 3	02-17-2022
B	ADDENDUM NO. 2	02-08-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	DCM
DESIGNED BY:	PDG
DRAWN BY:	GJN

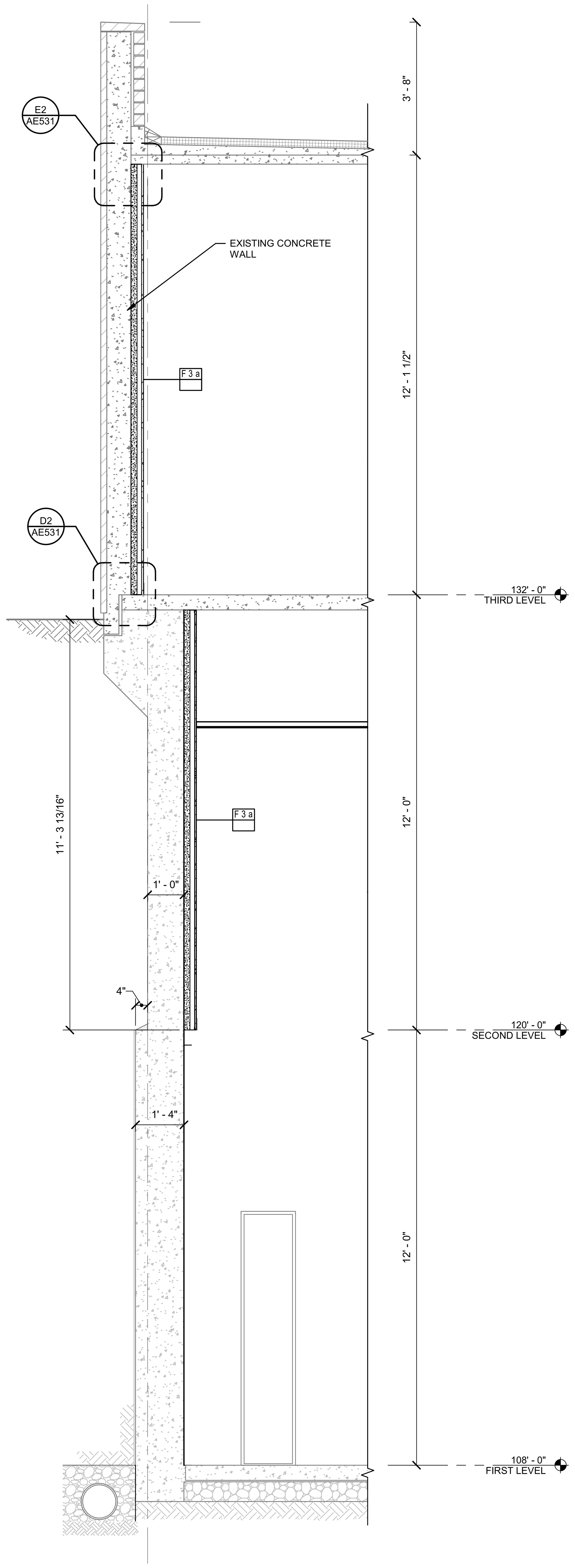
SHEET TITLE:
EXTERIOR ELEVATIONS

SHEET ID:
AE203

NOT FOR CONSTRUCTION

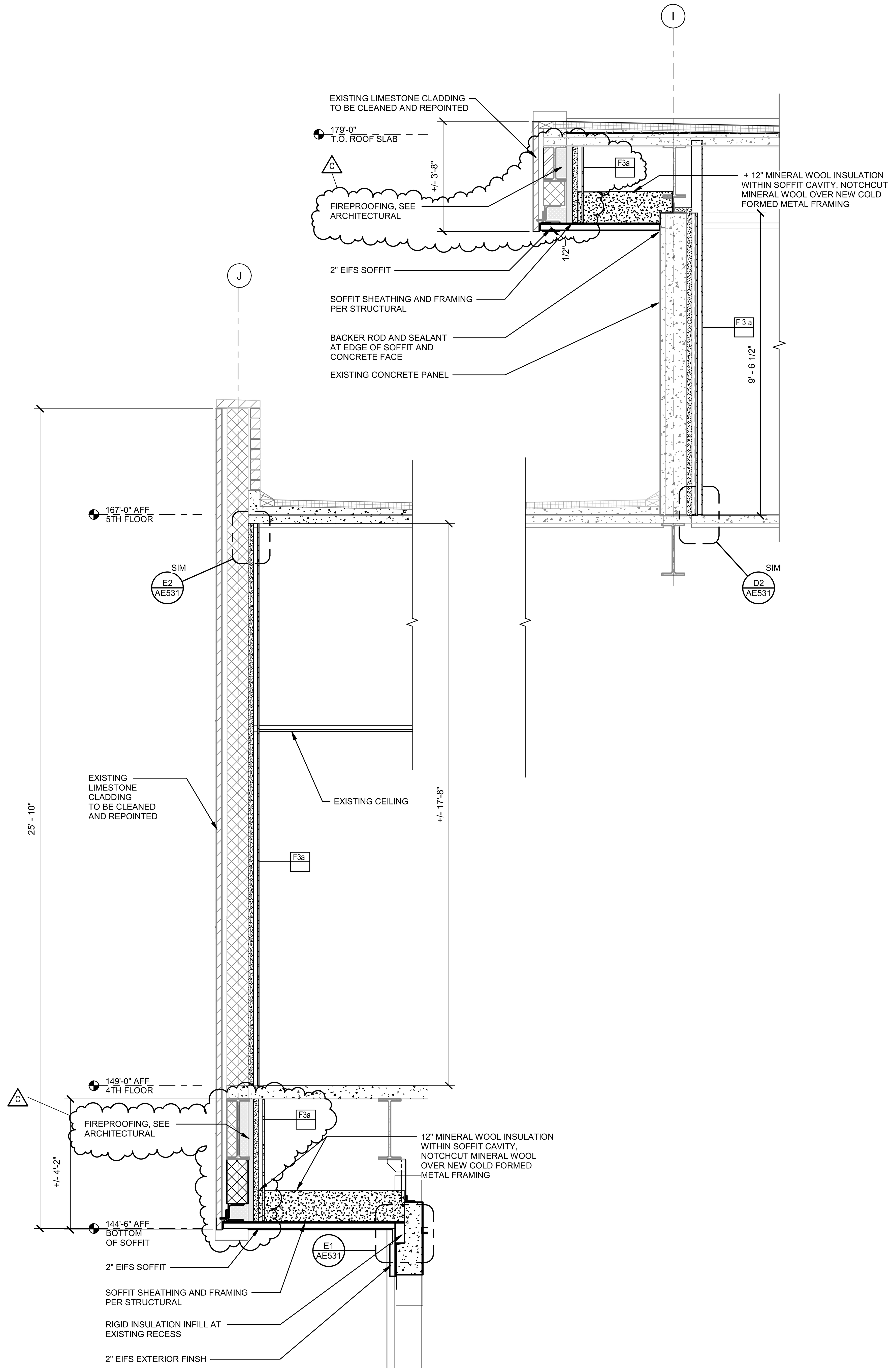
NOTES

1. SEE SHEET AE001 FOR SYMBOLS, LEGENDS AND GENERAL NOTES.
2. COORDINATE INTERIOR AND EXTERIOR INSULATION EXTENTS WITH PLANS.



A1 EXTERIOR WALL SECTION AT LIBRARY

1/2" = 1'-0"



A4 WALL SECTION

1/2" = 1'-0"

WALL SECTION NOTE: FOR 'SIM' CONDITION REFERENCED FROM D1/AE203, THE SOFFIT ABOVE THE COVERED LOADING PLATFORM, BASIS OF DESIGN SOFFIT PRODUCT TO BE:

- PAC-CLAD, FLUSH SOLID 22GA WHITE PANEL
  1. INSTALLED OVER EXTERIOR GRADE SEALED MUD / TAPED SHEATHING.
  2. PANELS TO BE INSTALLED PERPENDICULAR TO OUTSIDE WALL, LONG SPANS WITH NO SPLICING. VERIFY WITH MANUFACTURER'S STANDARD LENGTHS.
  3. COPE AT CORNERS AS REQUIRED.
- MAINTAIN DRIPEDGE PROTECTION BEHIND STONE FACADE, MINIMUM 1/4" STEP UP.
- PERIMETER TRIM AND CONNECTORS PER MANUFACTURER'S RECOMMENDATIONS.

C

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LICENSED ARCHITECT
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No. 2409
STATE OF MAINE
Daniel C. Moreno 02/17/2022

CURRENT ISSUE STATUS:
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JANUARY 7, 2022

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ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
C	ADDENDUM NO. 3	02-17-2022
B	ADDENDUM NO. 2	02-08-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	DCM
DESIGNED BY:	PDG
DRAWN BY:	GJN

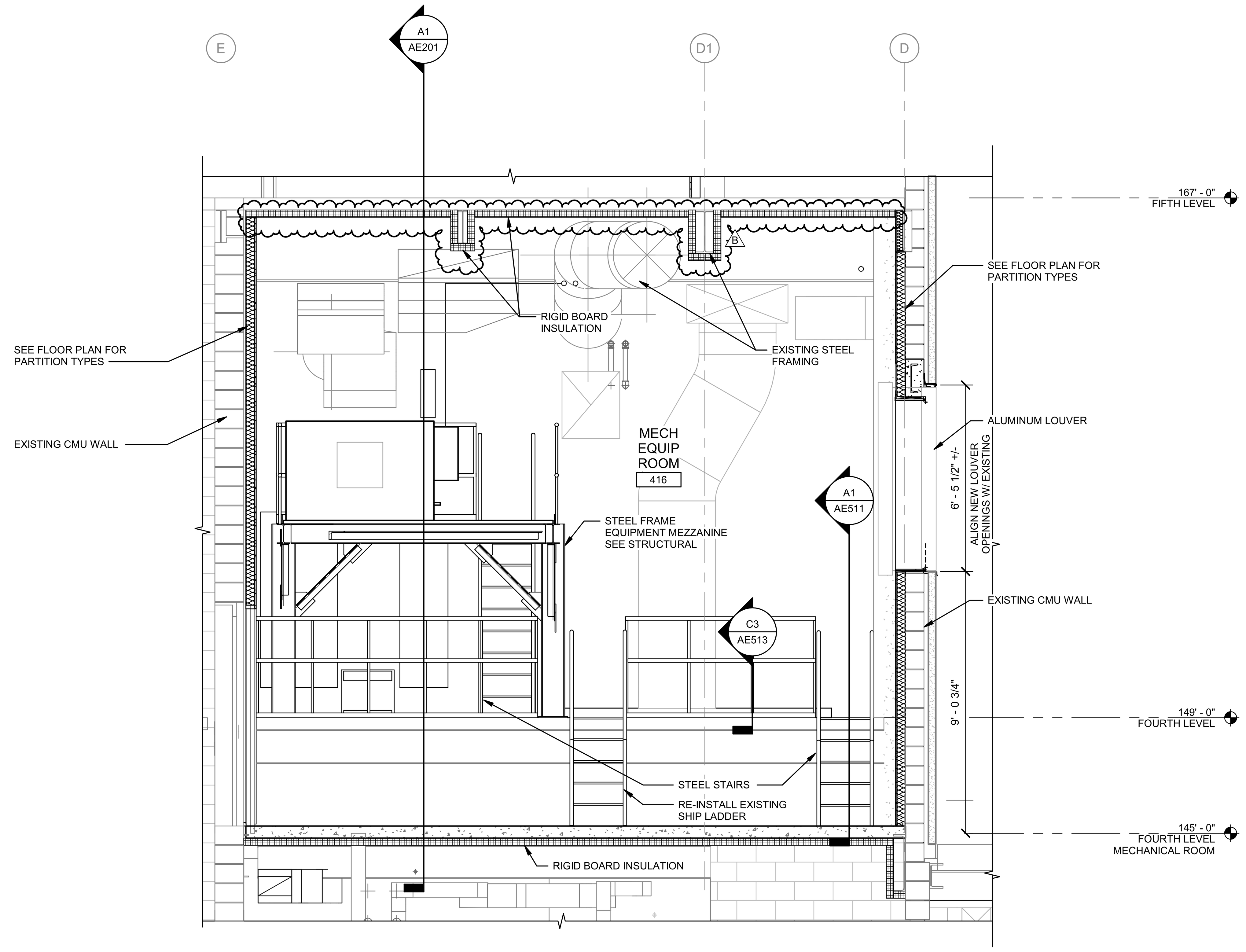
SHEET TITLE:
EXTERIOR WALL SECTIONS

SHEET ID:
AE301

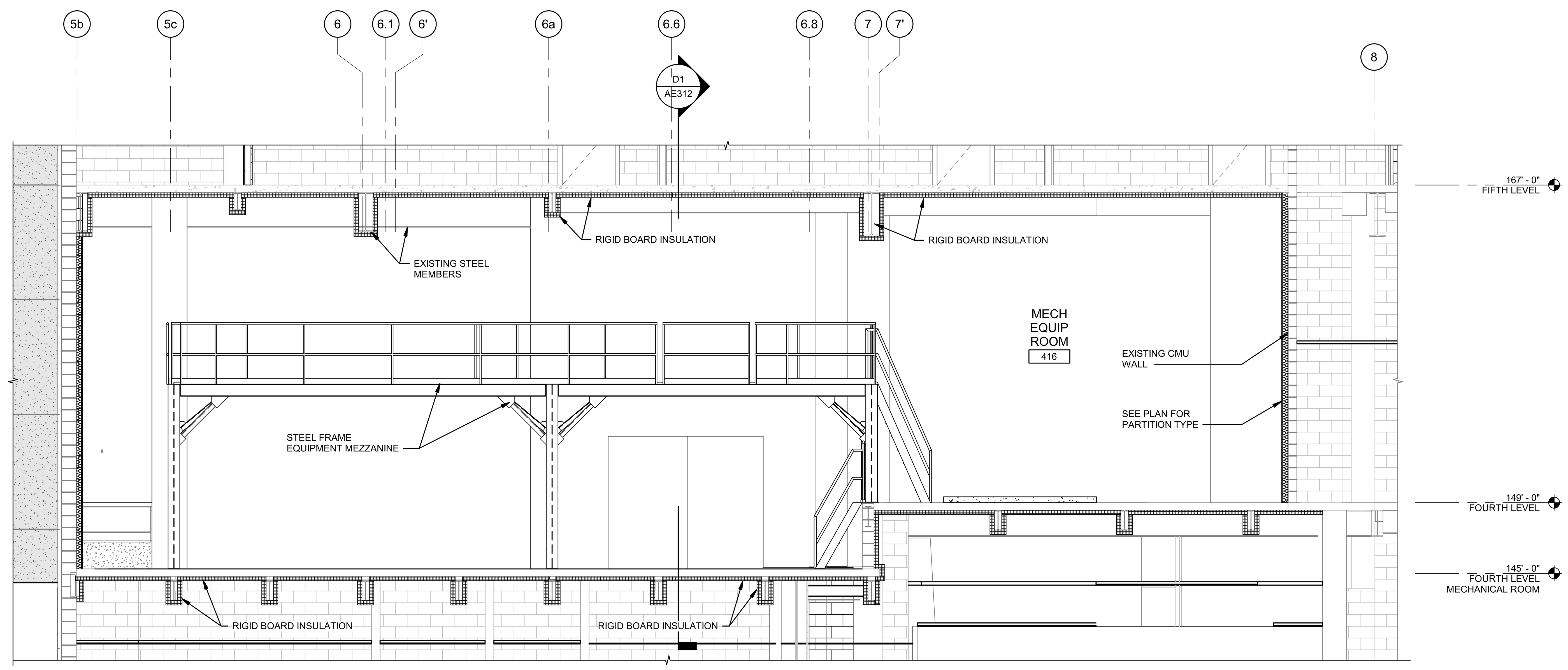
NOT FOR CONSTRUCTION

NOTE

1. SEE A-001 FOR GENERAL NOTES, LEGENDS AND SYMBOLS



D1 BUILDING SECTION
3/8" = 1'-0"



A1 BUILDING SECTION
1/4" = 1'-0"

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LICENSED ARCHITECT ELIZABETH HUCKERS No. 4338 STATE OF MAINE
2/17/2022

CURRENT ISSUE STATUS:
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JANUARY 7, 2022

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STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

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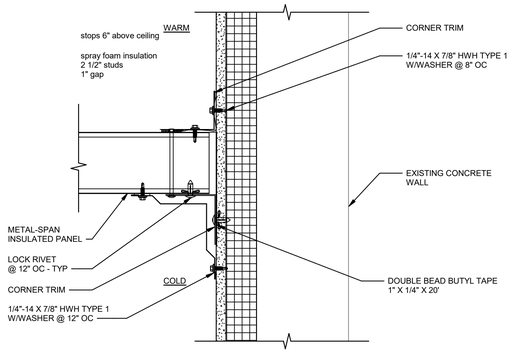
B	ADDENDUM NO. 3	02-17-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	JLR

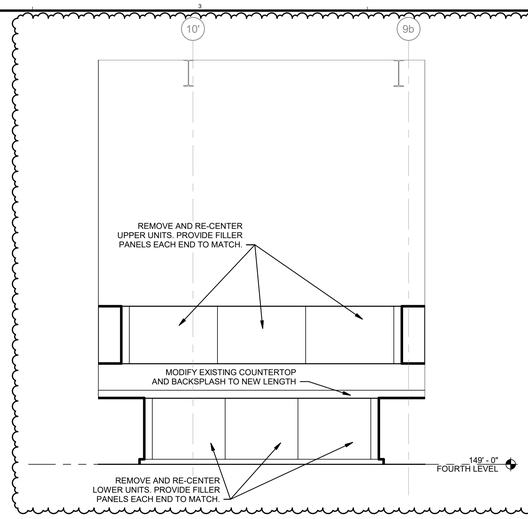
SHEET TITLE:
PARTIAL BUILDING SECTIONS

SHEET ID:
AE312

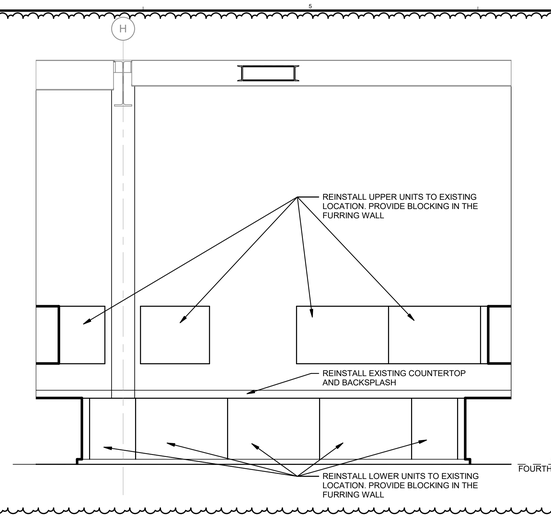
NOT FOR CONSTRUCTION



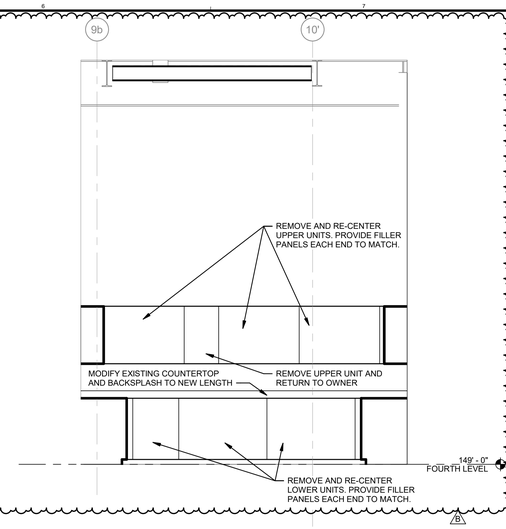
D1 SECTION
3" = 1'-0"



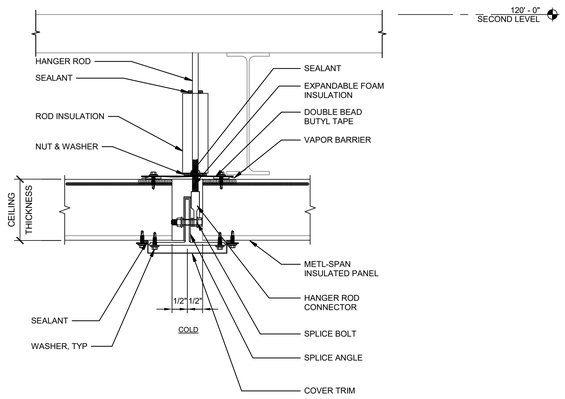
D2 SCIENCE LAB 406 - A
3/8" = 1'-0"



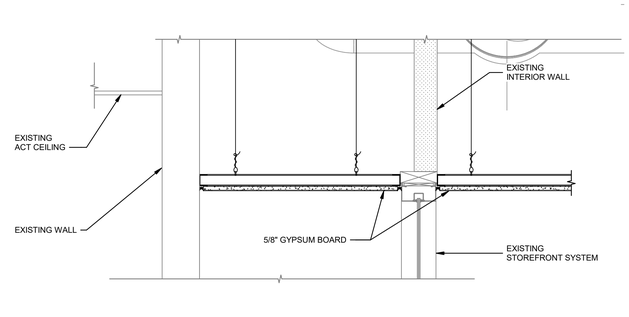
D4 SCIENCE LAB 406 - B
3/8" = 1'-0"



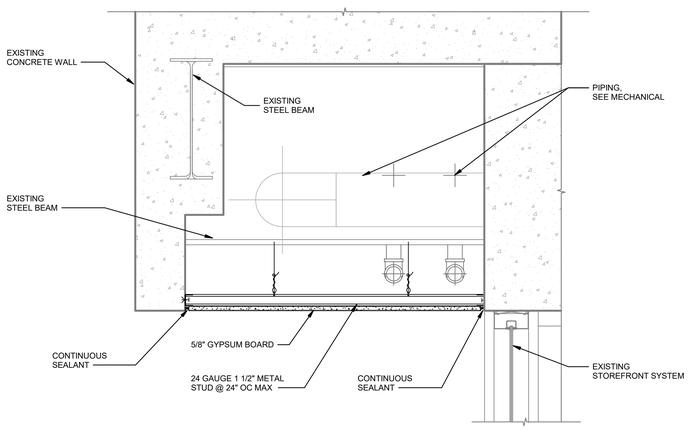
D6 SCIENCE LAB 406 - C
3/8" = 1'-0"



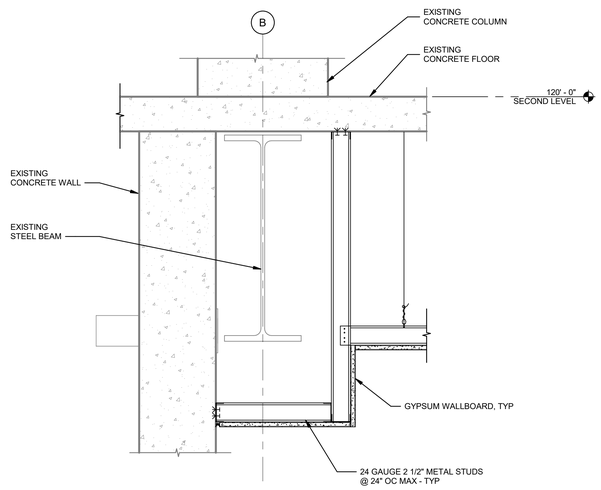
B1 CEILING SUPPORT w/ CHANNEL AND COVER TRIM
1 1/2" = 1'-0"



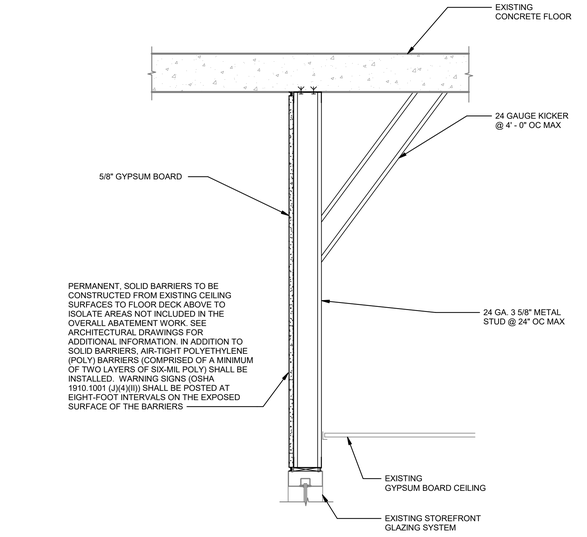
B2 SECTION
1 1/2" = 1'-0"



A1 SECTION DETAIL @ SOFFIT
1 1/2" = 1'-0"



A2 CORNER SOFFIT @ FIRST FLOOR
1 1/2" = 1'-0"



A5 ENCAPSULATION WALL DETAIL
1 1/2" = 1'-0"

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LICENSED ARCHITECT
ELIZABETH HUCKINS
No. 4338
STATE OF MAINE
2/17/2022

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JANUARY 7, 2022

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REV	REVISION ISSUE DESCRIPTION	DATE
A	ISSUED FOR BID	01-07-2022
B	ADDENDUM NO. 3	02-17-2022

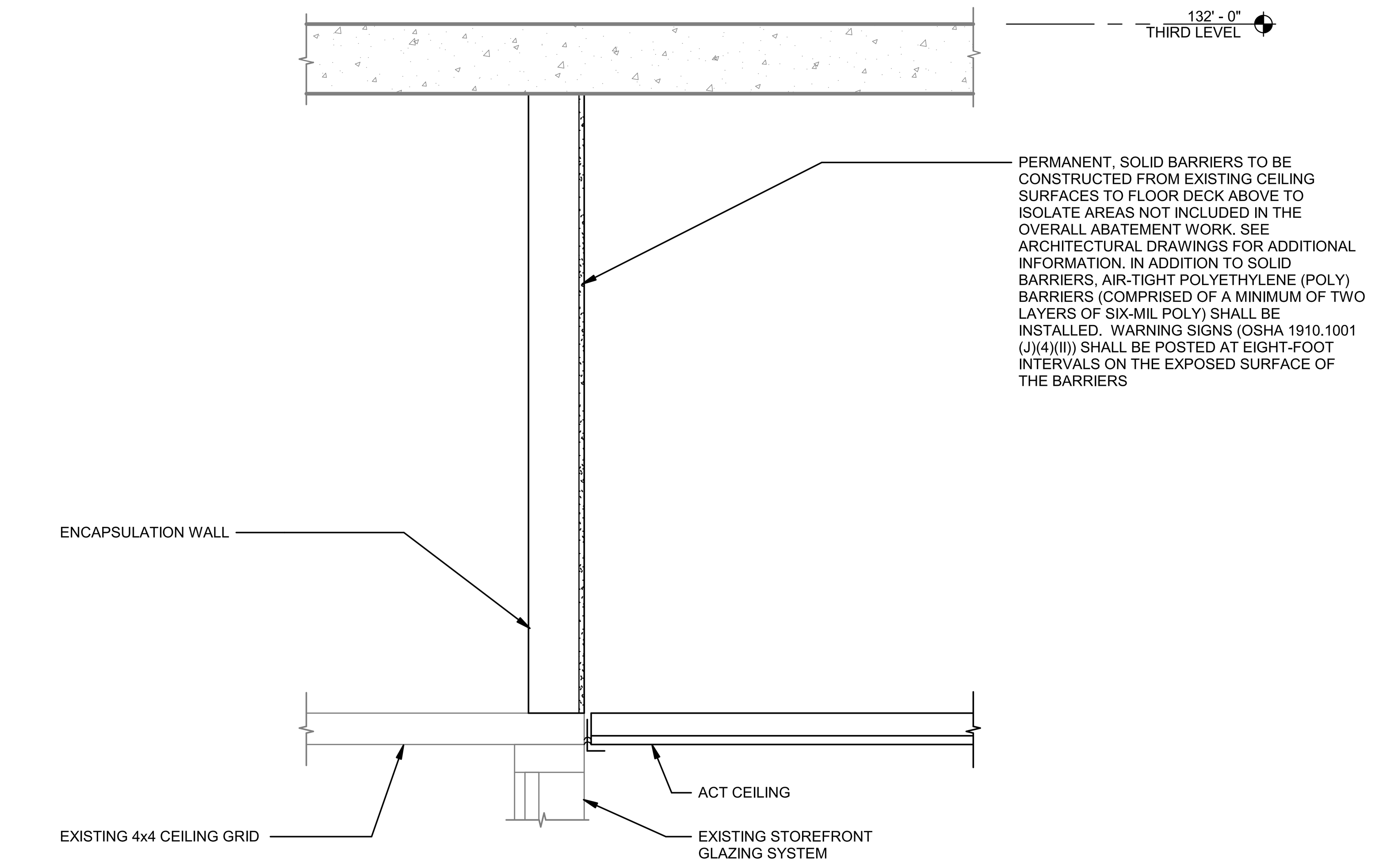
PROJECT NO.	361820720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	SMB

SHEET TITLE:
INTERIOR DETAILS

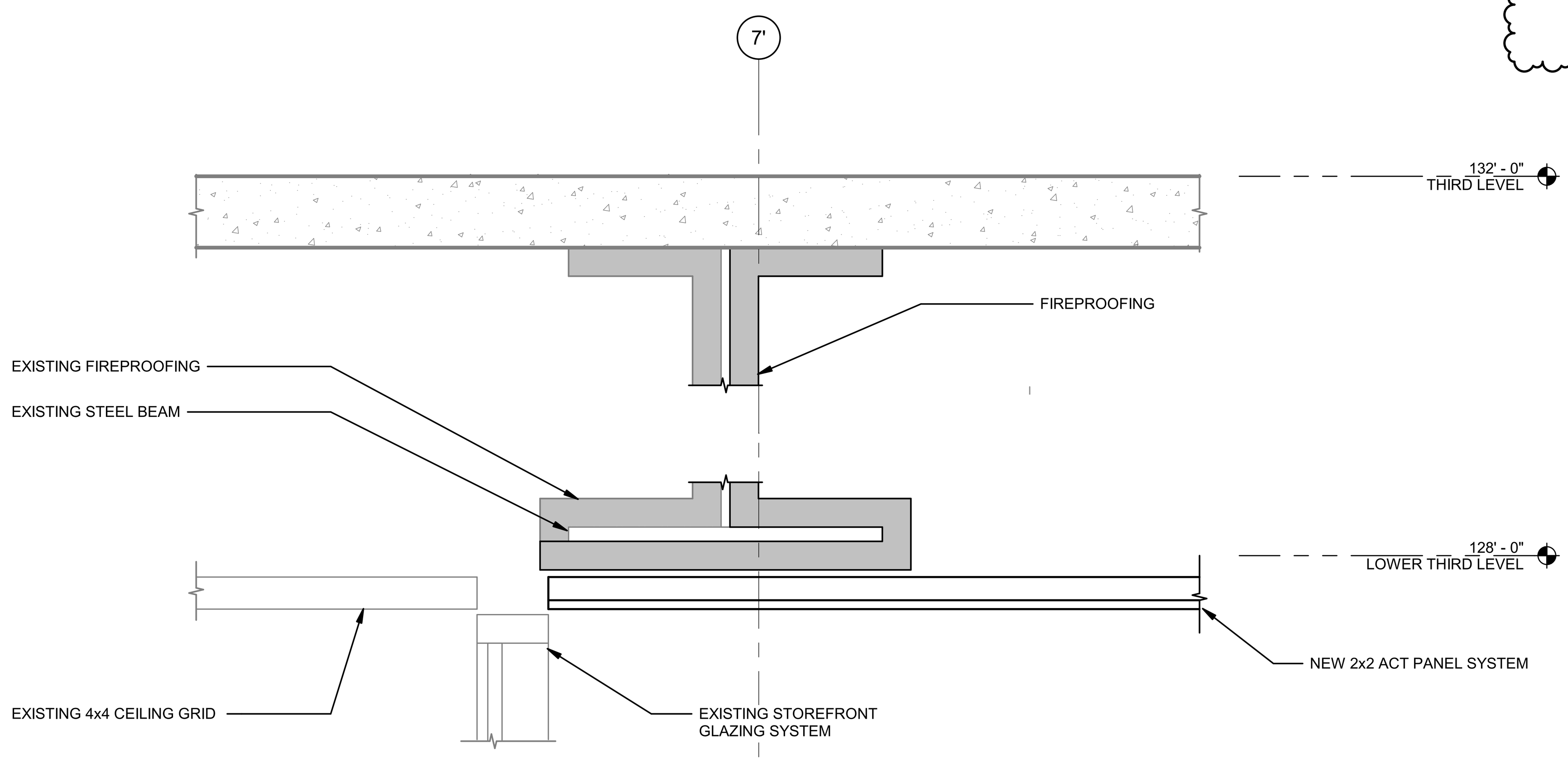
SHEET ID:
AE512

NOT FOR CONSTRUCTION

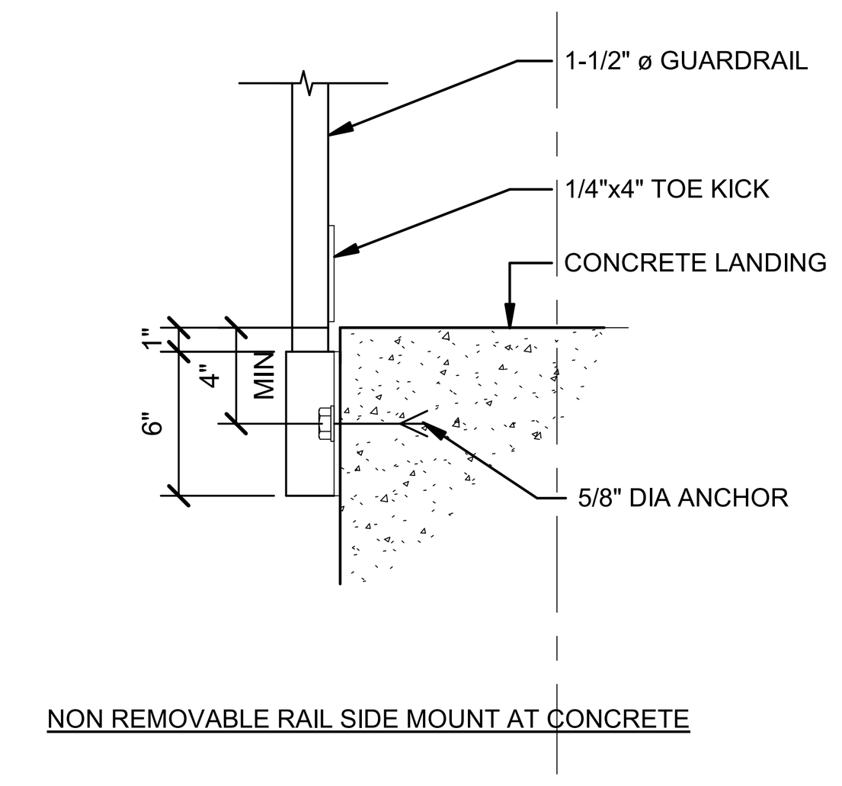
BIM 360://361820720 - ME Cultural Building Mechanical (Upgrades)/361820720_AE512.rvt



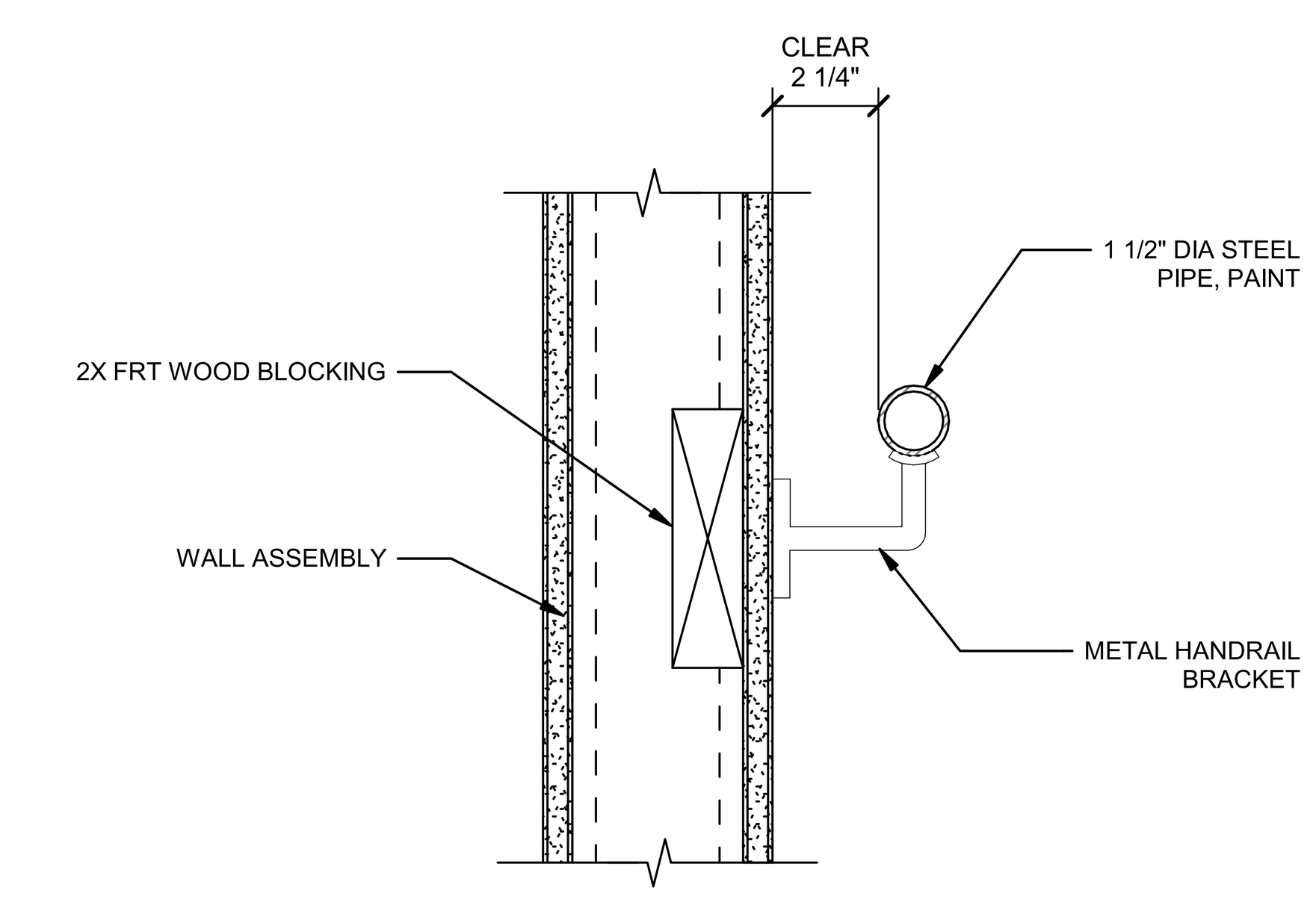
D1 ENCAPSULATION WALL
1 1/2" = 1'-0"
0 1/2' 1' 1 1/2'



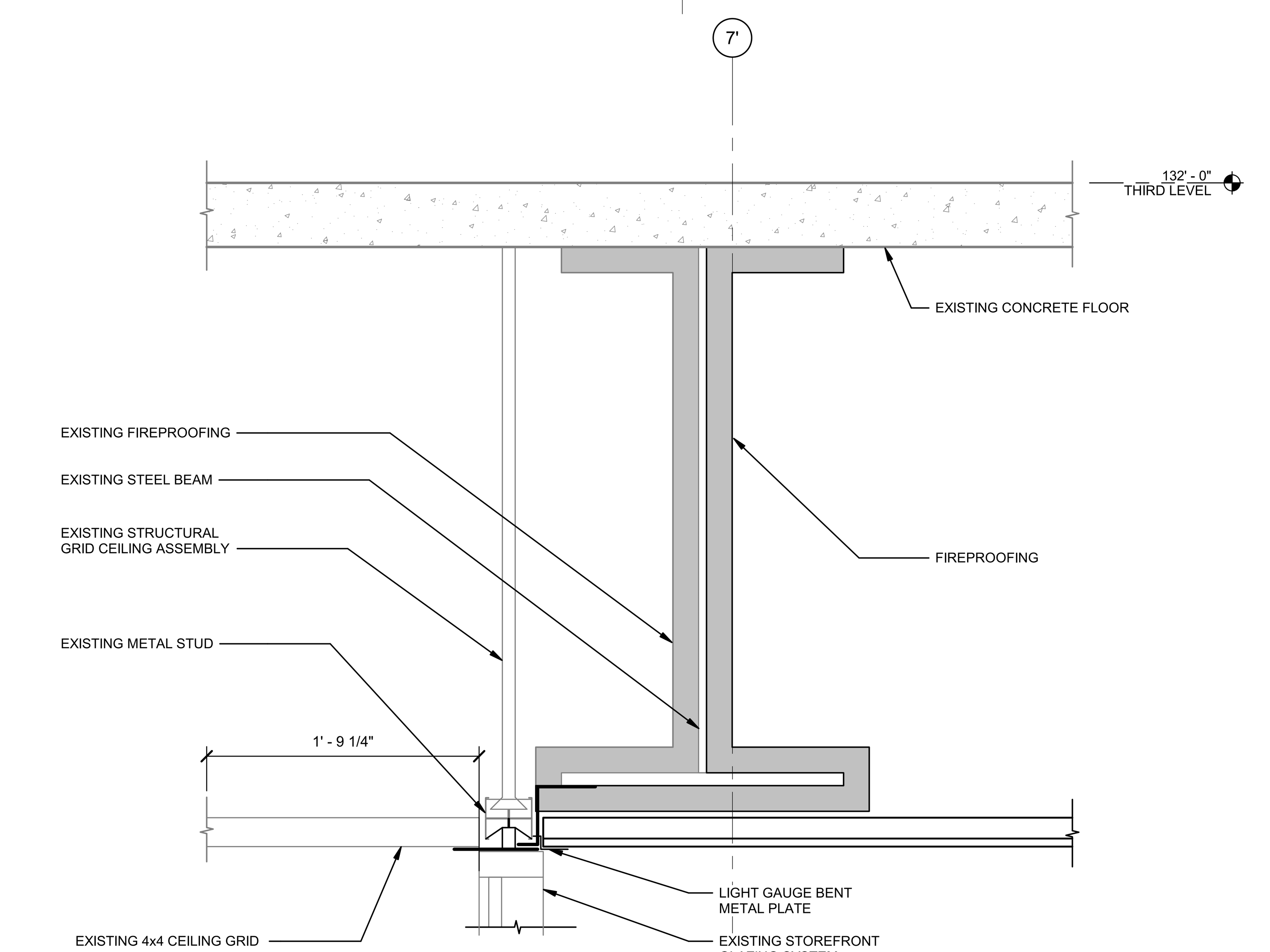
C1 ENCAPSULATION WALL
1 1/2" = 1'-0"
0 1/2' 1' 1 1/2'



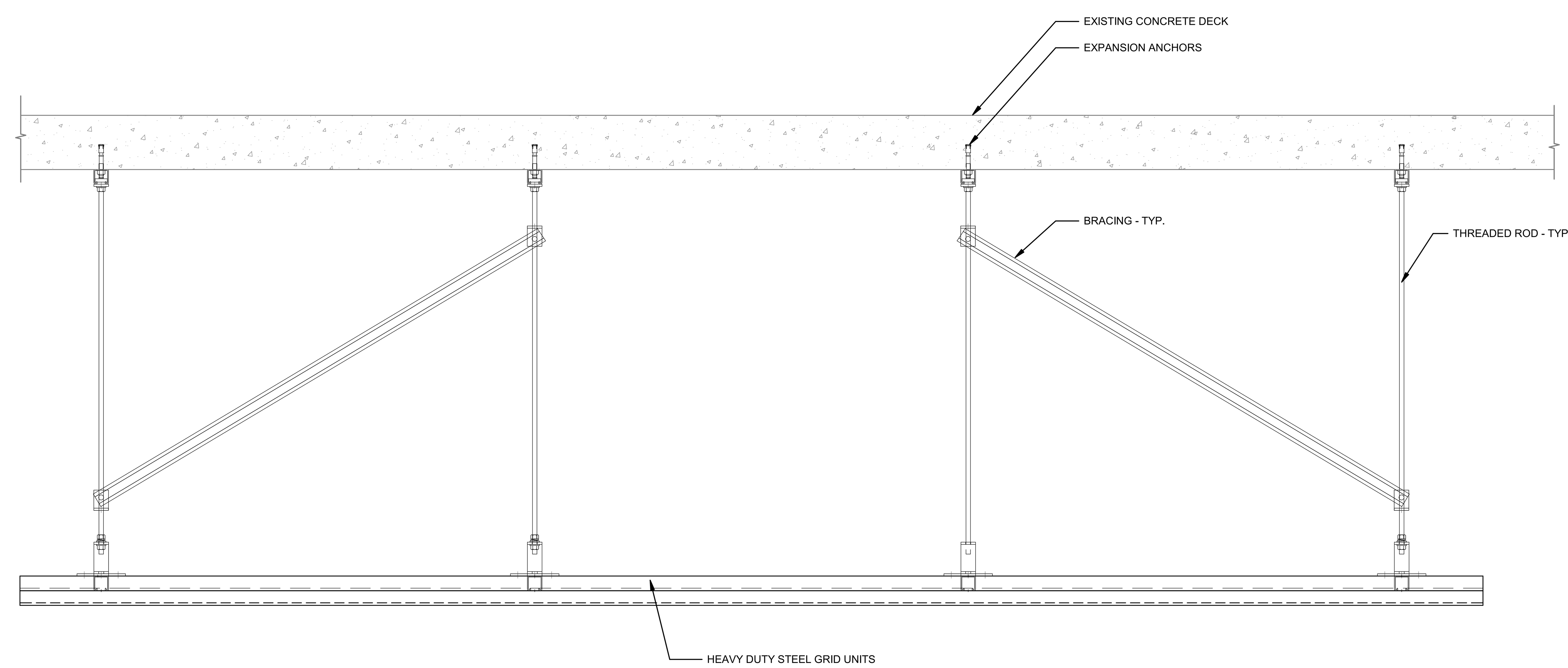
C3 GUARDRAIL DETAIL
1 1/2" = 1'-0"
0 1/2' 1' 1 1/2'



C5 HANDRAIL DETAIL
1 1/2" = 1'-0"
0 1/2' 1' 1 1/2'



A1 ENCAPSULATION WALL
1 1/2" = 1'-0"
0 1/2' 1' 1 1/2'



A3 UNISTRUT GRID DETAIL
1 1/2" = 1'-0"
0 1/2' 1' 1 1/2'

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(207) 624-7314

LICENSED ARCHITECT
ELIZABETH HUCKINS
No. 4338
STATE OF MAINE
2/17/2022

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

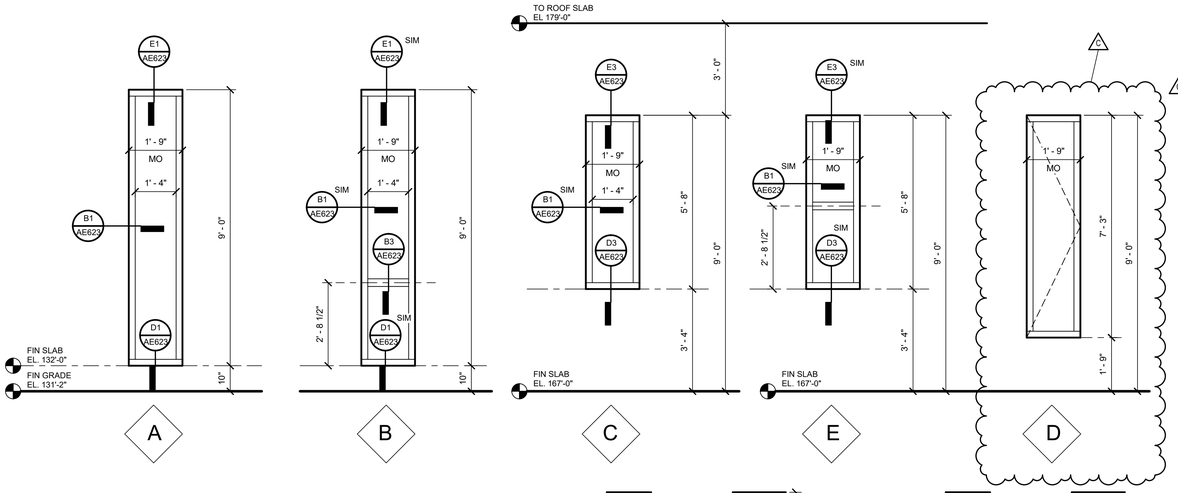
REV	REVISION ISSUE DESCRIPTION	DATE
B	ADDENDUM NO. 3	02-17-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	SMB

SHEET TITLE:
INTERIOR DETAILS

SHEET ID:
AE513

NOT FOR CONSTRUCTION



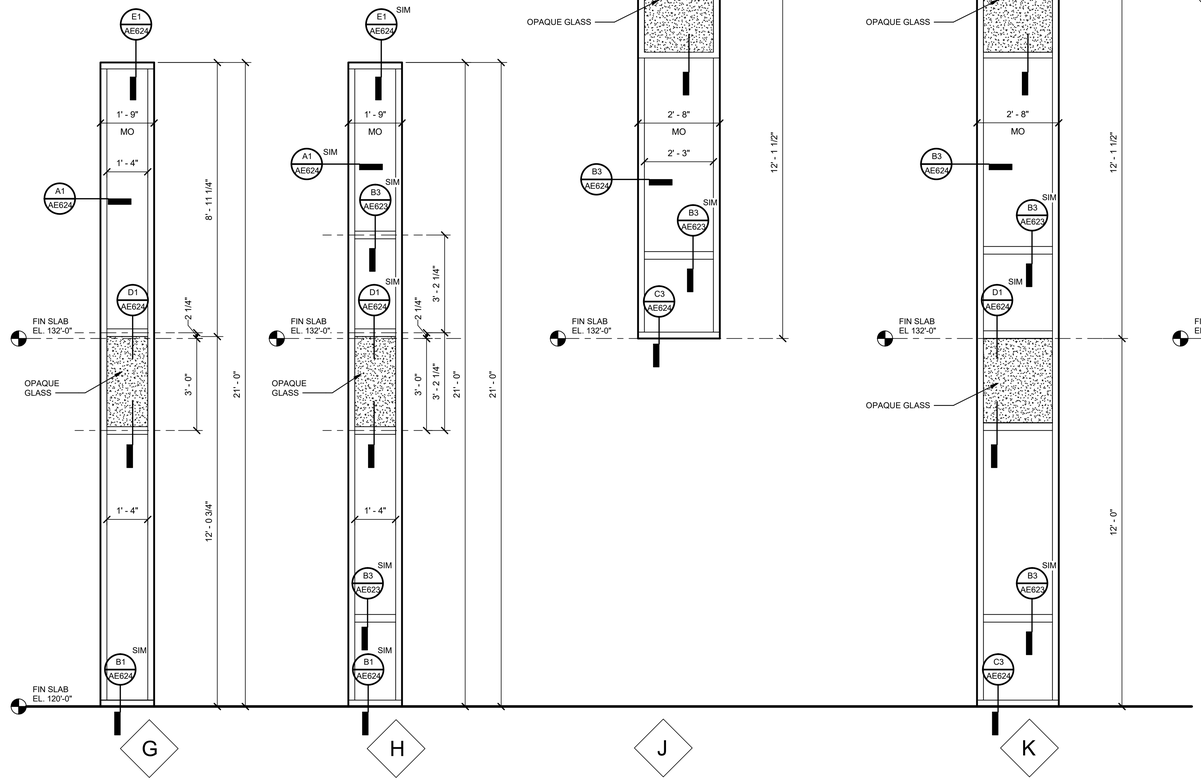
STOREFRONT AND CURTAINWALL SCHEDULE (BID SET #2)					
ID	WIDTH	HEIGHT	TEMPERED	BoD PRODUCT	NOTES
A	1' - 9"	9' - 0"		Kawneer 601T Thermal Break Storefront	
B	1' - 9"	9' - 0"		Kawneer 601T Thermal Break Storefront	
C	1' - 9"	9' - 0"		Kawneer 601T Thermal Break Storefront	
D	1' - 9"	7' - 3"	YES	Kawneer	FULLY OPERABLE WINDOW; WINDOW OPERATION TO BE FIELD VERIFIED FOR CLEARANCES TBD. HARDWARE TO BE NON-LOCKING FROM ROOF SIDE.
E	1' - 9"	7' - 3"		Kawneer 601T Thermal Break Storefront	
G	1' - 9"	21' - 0"		Kawneer 1620UT Thermal Break Curtainwall	
H	1' - 9"	21' - 0"		Kawneer 1620UT Thermal Break Curtainwall	
J	2' - 8"	12' - 2 1/2"		Kawneer 1620UT Thermal Break Curtainwall	
K	2' - 8"	24' - 2 1/2"	VARIES	Kawneer 1620UT Thermal Break Curtainwall	
L		12' - 8 1/2"	VARIES	Kawneer 1620UT Thermal Break Curtainwall	WIDTH VARIES DUE TO JAMB BEING PARALLEL TO TAPERED COLUMN
M		36' - 6"	VARIES	Kawneer 1620UT Thermal Break Curtainwall	WIDTH VARIES DUE TO JAMB BEING PARALLEL TO TAPERED COLUMN
N		36' - 6"	AS NOTED	Kawneer 1620UT Thermal Break Curtainwall	WIDTH VARIES DUE TO JAMB BEING PARALLEL TO TAPERED COLUMN
V	29' - 2"	9' - 0"	YES	Kawneer 601T Thermal Break Storefront	
W	29' - 2"	9' - 0"	YES	Kawneer 601T Thermal Break Storefront	

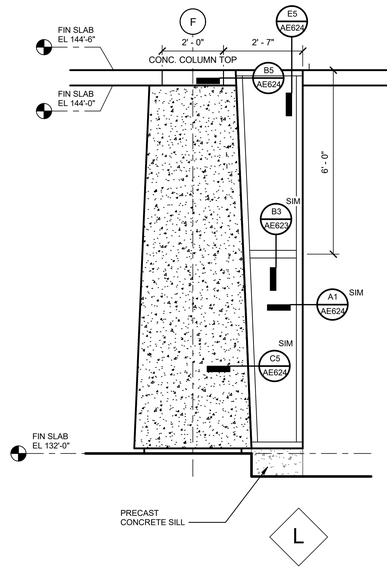
SCHEDULE NOTES

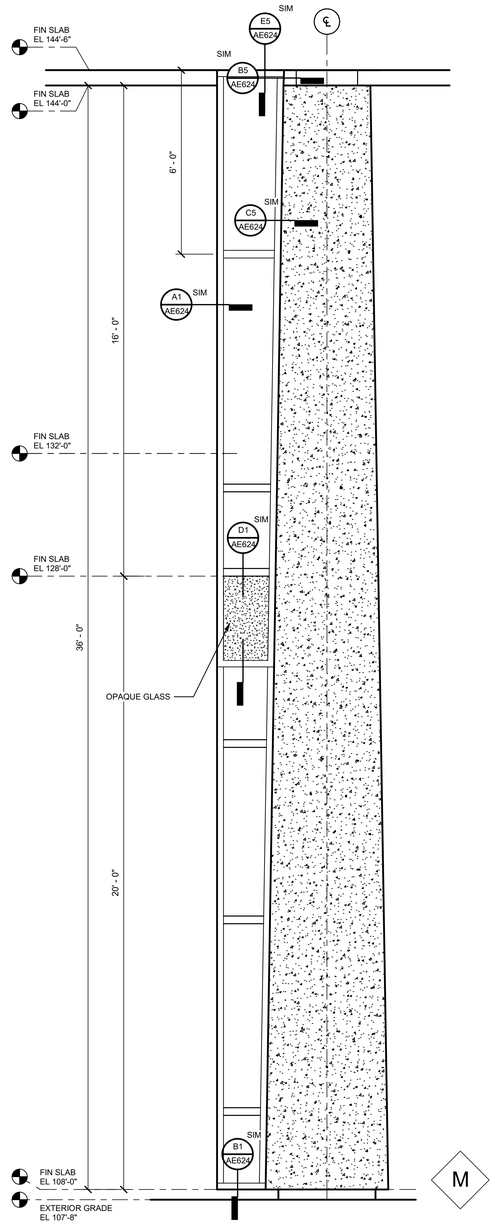
1. ALL R.O. / M.O. DIMENSIONS ARE TO BE VIF TO ENSURE ASSEMBLIES ARE COMPATABILE WITH EXISTING TO REMAIN OPENINGS.
2. STOREFRONT AND CURTAINWALL TO CONSIST OF DOUBLE-GLAZED ASSEMBLY, 1" THICK TOTAL.
   A. NORTH FACE: 1/4" CLEAR - 1/2" GAP - 1/4" CLEAR
   B. SOUTH / EAST / WEST FACES: 1/4" LOW E - 1/2" GAP - 1/4" CLEAR
3. MAINTAINING THE ORIGINAL DESIGN INTENT AND EXISTING CHARACTERISTICS OF THE ENCLOSURE FOR THIS PROJECT IS ESSENTIAL. MATCH EXISTING IN SO FAR AS PRACTICAL OR POSSIBLE.

NOTES

1. ALL WINDOWS / STOREFRONT / CURTAINWALL WITH ASSOCIATED DOORS ARE PART OF BID ALT #2
2. ALL NEW WINDOWS ARE TO BE FIXED TYPE, WITH HORIZONTAL MUNTINS MATCHING EXISTING HEIGHTS AND PROFILE DIMENSIONS, TO MAXIMUM EXTENT POSSIBLE.
3. ALL MASONRY OPENINGS DIMENSIONS, AND ANY HISTORICAL WINDOW ELEMENTS BEING REPRESENTED IN NEW WINDOW ASSEMBLIES, ARE TO BE VERIFIED IN THE FIELD PRIOR TO NEW ASSEMBLY FABRICATION. VERIFIED DIMENSIONS TO BE REPRESENTED ON SHOP DRAWINGS FOR A/E REVIEW, PRIOR TO FABRICATION.
4. EXISTING BIRD NETTING AT UPPER EXTENTS OF EXTERIOR SOUTH WALL TO REMAIN, REMOVAL TO BE CONFIRMED BY A/E IN THE FIELD.







A1 STORAGEFRONT AND CURTAINWALL TYPES
1/2" = 1'-0"

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LICENSED ARCHITECT
DANIEL C. MORENO
No. 2409
STATE OF MAINE
02.17.2022

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
C	ADDENDUM NO. 3	02-17-2022
B	ADDENDUM NO. 2	02-08-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO.	361820720
PROJECT MANAGER:	KFM
A/E OF RECORD:	DCM
DESIGNED BY:	PDG
DRAWN BY:	GJN

SHEET TITLE:
STOREFRONT AND CURTAIN WALL INFORMATION

SHEET ID:
AE621

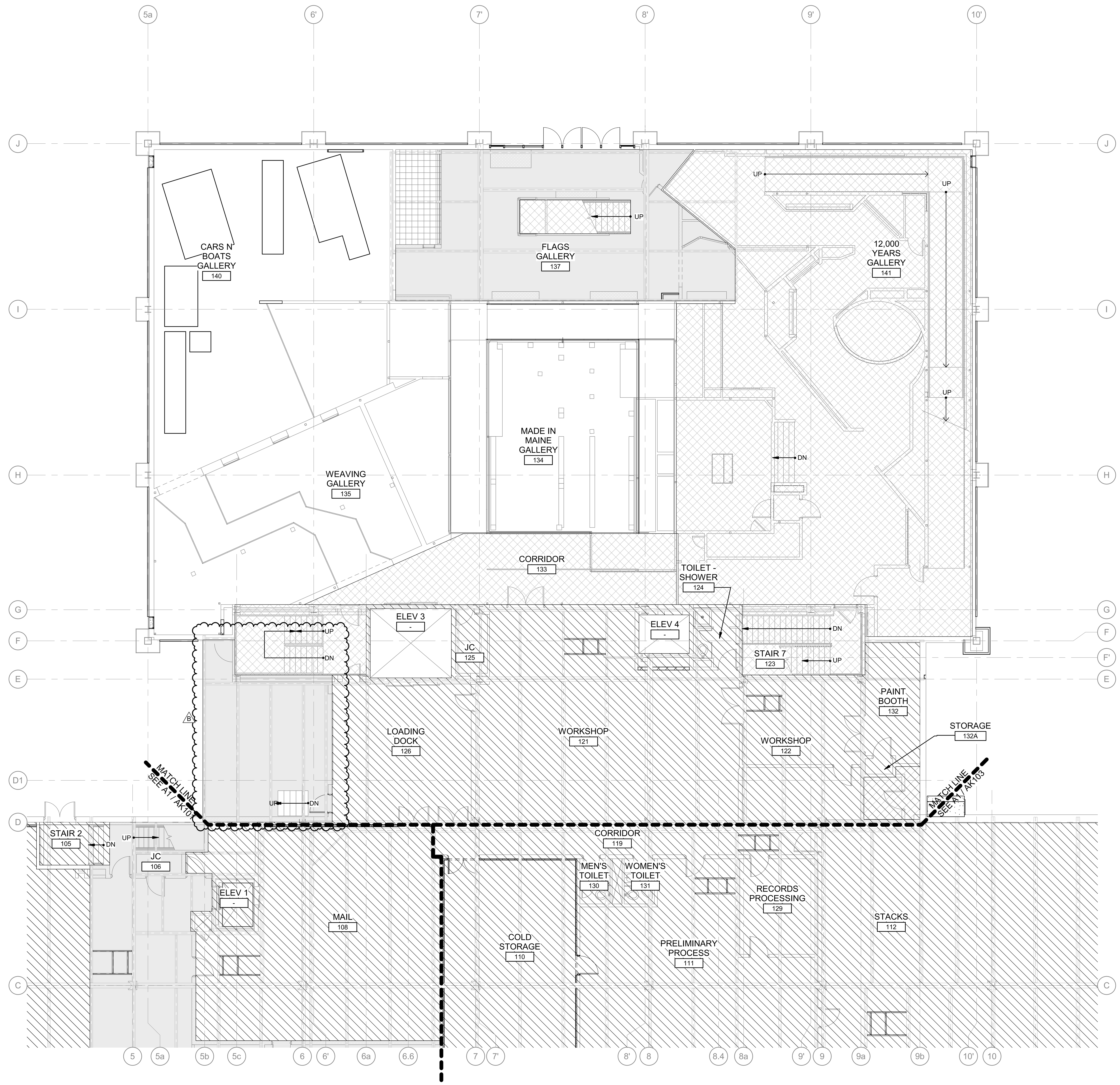
NOT FOR CONSTRUCTION

BIM 360://361820720 - ME Cultural Building Mechanical Upgrades/361820EP_ENV_R20.rvt

NOTES

1. SEE SHEET A - 001 FOR SYMBOLS, LEGENDS AND GENERAL NOTES.
2. ALL FLOOR CONSTRUCTION AND ASSOCIATED SECONDARY MEMBERS SHALL RECEIVE A FIRE-RESISTANCE RATING OF 2 HOURS UNLESS NOTED OTHERWISE.
3. ALL ROOF CONSTRUCTION AND ASSOCIATED SECONDARY MEMBERS SHALL RECEIVE A FIRE RESISTANCE RATING OF 1 HOUR UNLESS NOTED OTHERWISE.
4. ALL BEARING WALLS AND PRIMARY STRUCTURAL FRAMES SHALL RECEIVE A FIRE-RESISTANCE RATING OF 2 HOURS UNLESS NOTED OTHERWISE.

○ ADDITIVE BID ALTS



A1 MUSEUM - FIRST LEVEL FIREPROOFING PLAN

1/8" = 1'-0"

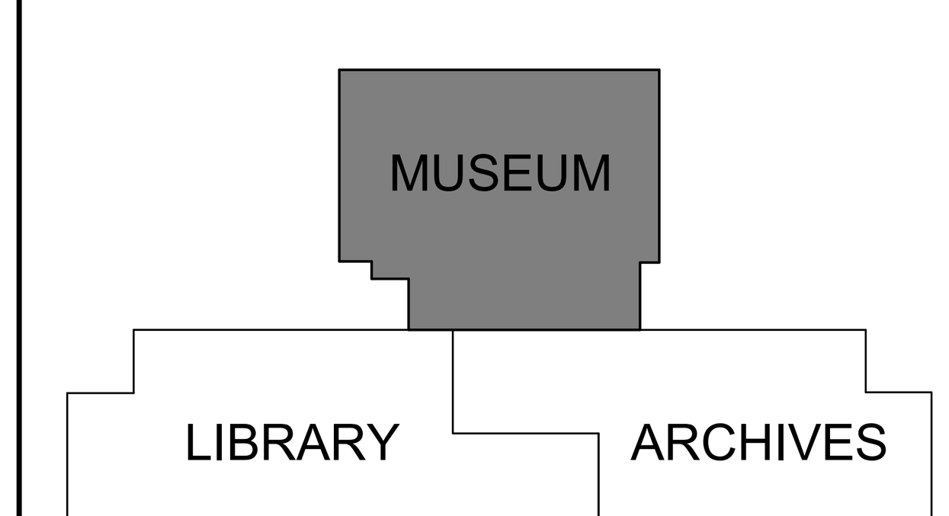
0 4' 8' 16'

PLAN NORTH

LEGEND

- SPRAY APPLIED FIREPROOFING ON STEEL ONLY
- SPRAY APPLIED FIREPROOFING ON STEEL AND DECKING
- EXISTING SPRAY APPLIED FIREPROOFING
- 3" MINERAL FIBER-BOARD ON DECK AND STEEL
- EXISTING ASBESTOS CONTAINING SPRAY APPLIED FIREPROOFING TO REMAIN

KEY PLAN



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LICENSED ARCHITECT ELIZABETH HUCKINS No. 4338 STATE OF MAINE

2/17/2022

CURRENT ISSUE STATUS:

PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:

STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
B	ADDENDUM NO. 3	02-17-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	JLR

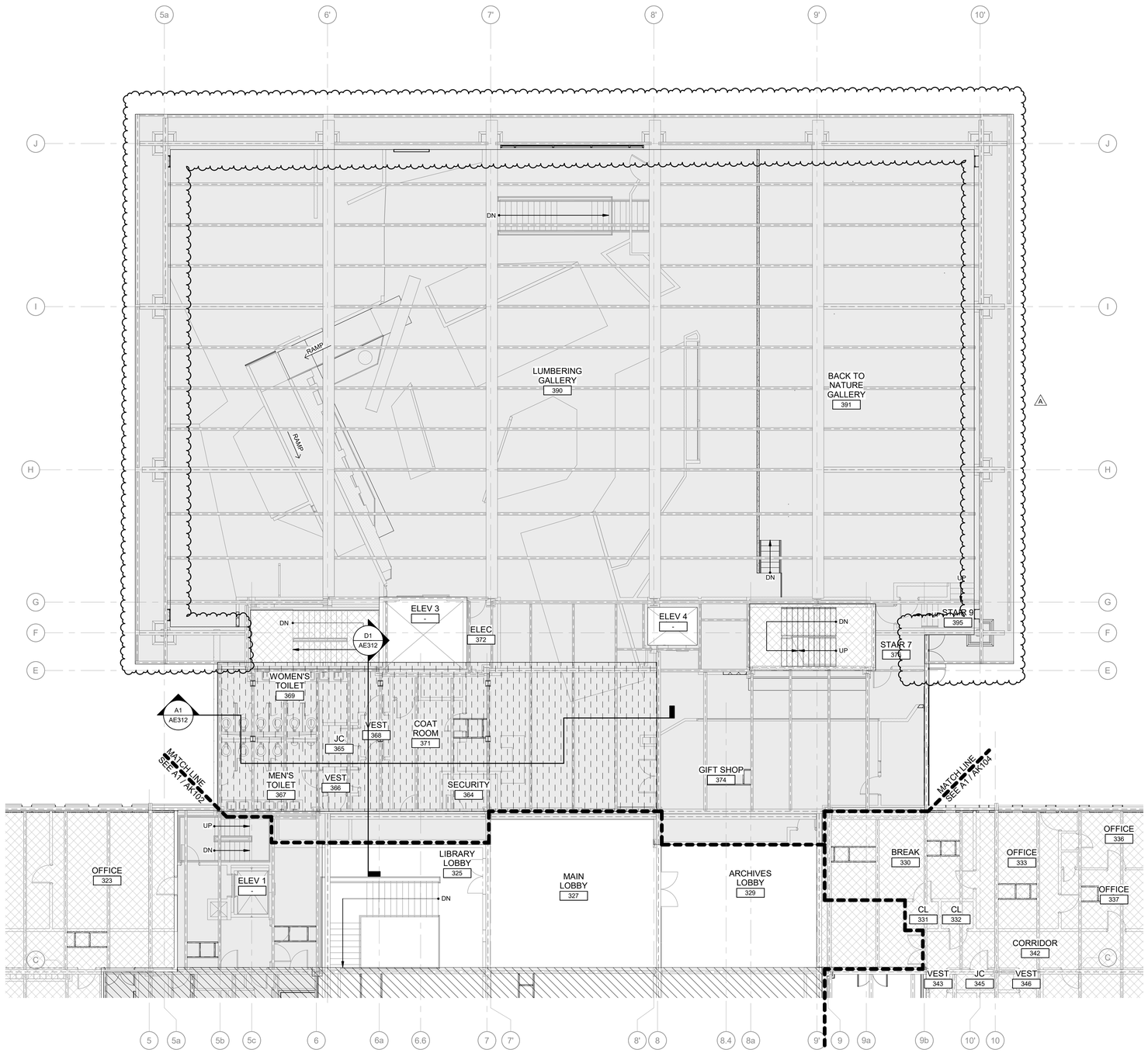
SHEET TITLE:

MUSEUM - FIRST LEVEL FIREPROOFING PLAN

SHEET ID:

AK105

NOT FOR CONSTRUCTION



A1 MUSEUM - THIRD LEVEL FIREPROOFING PLAN

1/8" = 1'-0"

0 4' 8' 16'

PLAN NORTH

NOTES

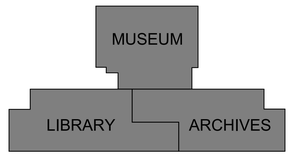
1. SEE SHEET A - 001 FOR SYMBOLS, LEGENDS AND GENERAL NOTES.
2. ALL FLOOR CONSTRUCTION AND ASSOCIATED SECONDARY MEMBERS SHALL RECEIVE A FIRE-RESISTANCE RATING OF 2 HOURS UNLESS NOTED OTHERWISE.
3. ALL ROOF CONSTRUCTION AND ASSOCIATED SECONDARY MEMBERS SHALL RECEIVE A FIRE RESISTANCE RATING OF 1 HOUR UNLESS NOTED OTHERWISE.
4. ALL BEARING WALLS AND PRIMARY STRUCTURAL FRAMES SHALL RECEIVE A FIRE-RESISTANCE RATING OF 2 HOURS UNLESS NOTED OTHERWISE.

○ ADDITIVE BID ALTS

LEGEND

- SPRAY APPLIED FIREPROOFING ON STEEL ONLY
- SPRAY APPLIED FIREPROOFING ON STEEL AND DECKING
- EXISTING SPRAY APPLIED FIREPROOFING
- 3" MINERAL FIBER-BOARD ON DECK AND STEEL
- EXISTING ASBESTOS CONTAINING SPRAY APPLIED FIREPROOFING TO REMAIN

KEY PLAN



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LICENSED ARCHITECT
ELIZABETH HUCKINS
No. 4338
STATE OF MAINE
2/17/2022

CURRENT ISSUE STATUS: PHASE 2 - ISSUED FOR BID JANUARY 7, 2022

PROJECT: STATE OF MAINE CULTURAL BUILDING ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
A.	ADDENDUM NO. 3	02-17-2022

PROJECT NO.	361820720
PROJECT MANAGER:	KFM
A/E OF RECORD:	EAH
DESIGNED BY:	TCM
DRAWN BY:	JLR

SHEET TITLE: MUSEUM - THIRD LEVEL FIREPROOFING PLAN

SHEET ID: AK107

NOT FOR CONSTRUCTION

BIM 360://361820720 - ME Cultural Building Mechanical Upgrades/361820720_ARCH.RVT

ABBREVIATIONS

@	AT
A	AMP
ABS	ACRYLONITRILE BUTADIENE STYRENE PLASTIC
ABV	ABOVE
AC	AIR CONDITIONING, AIR COMPRESSOR
AD	ACCESS DOOR
ADA	AMERICANS WITH DISABILITIES ACT
AF	AIR FILTER
AFF	ABOVE FINISHED FLOOR
AFM	AIR FLOW MEASURING STATION
AHU	AIR HANDLING UNIT
AL	ACOUSTICAL LINER
AMB	AMBIENT
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
APPROX	APPROXIMATELY
AS	AIR SEPARATOR
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASSY	ASSEMBLY
ATC	AUTOMATIC TEMPERATURE CONTROL
ATT	ACOUSTICAL ATTENUATOR
AV	AUTOMATIC VENT
BDD	BACKDRAFT DAMPER
BFP	BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
BLDG	BUILDING
BOD	BOTTOM OF DUCT
BTUH	BTU PER HOUR
C	CENTERLINE
CA	COMPRESSED AIR
CAP	CAPACITY
CC	COOLING COIL
CD	CONDENSATE DRAIN
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
CH	CHILLER
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CLG	CEILING
CO	CLEAN OUT, CARBON MONOXIDE
COL	COLUMN
CONC	CONCRETE
COND	CONDENSATE
CONN	CONNECTION
CONT	CONTINUATION
CONV	CONVECTOR
CP	CONTROL PANEL, CONDENSATE PUMP
CPT	CONDENSATE PUMP TRAP
CSA	CANADIAN STANDARDS ASSOCIATION
CU	CONDENSING UNIT
CUH	CABINET UNIT HEATER
CV	CONTROL VALVE
Cv	CONTROL VALVE RATING
CVT	CONSTANT VOLUME AIR TERMINAL
CW	COLD WATER
CWR	COLD WATER RETURN
CWS	COLD WATER SUPPLY
D	DRAIN
(D)	ITEMS TO BE DEMOLISHED
dB	DECIBELS
DB	DRY BULB
DC	DRY COOLER
DDC	DIRECT DIGITAL CONTROL
Ø, DIA	DIAMETER
DIFF	DIFFERENTIAL, DIFFUSER
DISCH	DISCHARGE
DN	DOWN
DOM	DOMESTIC
DP	DIFFERENTIAL PRESSURE
DWG	DRAWING
DWGS	DRAWINGS
E	ELECTRICAL, EXHAUST
(E)	EXISTING TO REMAIN
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EC	ELECTRICAL CONTRACTOR
EDR	EQUIVALENT DIRECT RADIATION
EER	ENERGY EFFICIENT RATIO
EF	EXHAUST FAN
EFF	EFFICIENCY
ELEC	ELECTRIC, ELECTRICAL
ELEV	ELEVATION
ENT	ENTERING
EPDM	ETHYLENE PROPYLENE DIENE MEMBRANE
EQUIP	EQUIPMENT
ESP	EXTERNAL STATIC PRESSURE
ET	EXPANSION TANK
EUH	ELECTRIC UNIT HEATER
EVAP	EVAPORATOR
EWC	ELECTRIC WATER COOLER
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
EXIST	EXISTING
EXT	EXPANSION TANK
EXP	EXPANSION
F	FAN, DEGREES FAHRENHEIT
FA	FRESH AIR
FAI	FRESH AIR INTAKE
FBG	FURNISHED BY GOVERNMENT
FC	FLEX CONNECTION
FCO	FLOOR CLEANOUT
FD	FIRE DAMPER, FLOOR DRAIN
FF	FINISH FLOOR
FIX	FIXTURE
FLA	FULL LOAD AMPS
FLR	FLOOR
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
FS	FLOAT SWITCH
FSD	FIRE-SMOKE DAMPER
FT	FEET
FTR	FIN TUBE RADIATION
FZ	FREEZESTAT
G	GAS
GA	GAUGE
GAL	GALLONS
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GMU	GLYCOL MAKEUP UNIT
GP	GENERAL PURPOSE
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GR	GLYCOL RETURN
GRH	GRAVITY RELIEF HOOD
GHWR	GLYCOL HOT WATER RETURN
GHWS	GLYCOL HOT WATER SUPPLY
GV	GATE VALVE
GSM	GALVANIZED SHEET METAL
GYP	GYPSUM WALLBOARD
HC	HEATING COIL
HOA	HANDS-OFF-AUTOMATIC
HOR	HORIZONTAL
HP	HORSEPOWER, HIGH PRESSURE
HR	HOUR
HT	HEIGHT
HUMID	HUMIDIFIER, HUMIDITY
HV	HEATING AND VENTILATINGUNITCONDITIONING
HVAC	HEATING, VENTILATING AND AIR
HW	HOT WATER
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
HX	HEAT EXCHANGER
HZ	HERTZ
IBR	HYDRONICS INSTITUTE
ID	INSIDE DIAMETER
IN	INCHES
INDIR	INDIRECT WASTE
KW	KILOWATT
L	LENGTH, LOUVER
LAT	LEAVING AIR TEMPERATURE
LD	LIQUEFIED PETROLEUM
LDB	LEAVING DRY BULB
LF	LINEAR FEET
LG	LONG
LOC	LOCATION, LOCATED
LP	LIQUEFIED PROPANE
LPR	LOW PRESSURE RETURN
LPS	LOW PRESSURE STEAM (15 PSI OR LESS)
LRA	LOCKED ROTOR AMPS
LS	LINE SET (REFRIG)
LVG	LEAVING
LWB	LEAVING WET BULB
LWT	LEAVING WATER TEMPERATURE
M	MECHANICAL
MANUF	MANUFACTURER
MAX	MAXIMUM
MAX PD	MAXIMUM PRESSURE DROP
MBH	1000 BTU PER HOUR
MBU	1000 BTU
MCA	MAXIMUM CIRCUIT AMPS
MCC	MOTOR CONTROL CENTER
MD	MOTORIZED DAMPER
MECH	MECHANICAL
MEZZ	MEZZANINE
MFG	MANUFACTURER
MIN	MINIMUM, MINUTES
MLS	MAIN LINE SET (REFRIG)
mm	MILLIMETERS
MNTD	MOUNTED
MOCP	MAXIMUM OVERCURRENT PROTECTION
MUA	MAKE-UP AIR
MUW	MAKE-UP WATER
N/A	NOT APPLICABLE
NATL	NATURAL
NC	NORMALLY CLOSED, NOISE CRITERIA
NEC	NATIONAL ELECTRIC CODE NFPA 70
NG	NATURAL GAS
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN, NUMBER
N02	NITROGEN DIOXIDE
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAF	OUTSIDE AIR FILTER, OUTSIDE AIR FAN
OAI	OUTSIDE AIR INTAKE
OAT	OUTSIDE AIR TEMPERATURE
OBVD	OPPOSED BLADE VOLUME DAMPER
OD	OUTSIDE DIAMETER
OED	OPEN ENDED DUCT
OS&Y	OUTSIDE STEM AND YOKE
P	PUMP, PITCH
PC	PUMPED CONDENSATE
PD	PRESSURE DROP
PLMB	PLUMBING
PRESS	PRESSURE
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
PT	PRESSURE TREATED
PVC	POLYVINYL CHLORIDE
QTY	QUANTITY
(R)	REMOVE
R	RADIUS, RETURN
RA	RETURN AIR
RAD	RADIATOR
RAF, RF	RETURN AIR FAN
RAT	RETURN AIR TEMPERATURE
REL	RELIEF
REQD	REQUIRED
RET	RETURN
RH	RELATIVE HUMIDITY
RL	REFRIGERANT LIQUID
RLA	RATED LOAD AMPS
RM	ROOM
RPM	REVOLUTIONS PER MINUTE
RS	REFRIGERANT SUCTION
RTU	ROOFTOP UNIT
S	SUPPLY DIFFUSER
SA	SUPPLY AIR
SCH	SCHEDULE
SCR	SCREEN
SD	SMOKE DAMPER
SF	SQUARE FOOT
SIM	SIMILAR
SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTOR'S NATIONAL ASSOCIATION
SOV	SHUT OFF VALVE
SP	STATIC PRESSURE
SPH	STATIC PRESSURE HIGH LIMIT
SPL	STATIC PRESSURE LOW LIMIT
SPS	STATIC PRESSURE SENSOR
SQ	SQUARE
SS	STAINLESS STEEL
STL	STEEL
SUP	SUPPLY
T	TEMPERATURE SENSOR, THERMOSTAT
TC	TOTAL COOLING
TEMP	TEMPERATURE
THK	THICK, THICKNESS
TG	TRANSFER GRILLE
TRANS	TRANSITION
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
V	VENT
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER
VEL	VELOCITY
VFD	VARIABLE FREQUENCY DRIVE
VRF	VARIABLE REFRIGERANT FLOW
VTR	VENT THROUGH ROOF
W	WIDTH, WATT
W/	WITH
WB	WET BULB
WC	WATER COLUMN
WCO	WALL CLEANOUT
WF	WALL FAN
WG	WATER GAUGE
WH	WATER HEATER
WMS	WIRE MESH SCREEN
WPD	WATER PRESSURE DROP

DUCTWORK SYMBOLS

- RETURN DUCT UP
- RETURN DUCT DOWN
- SUPPLY DUCT UP
- SUPPLY DUCT DOWN
- EXHAUST DUCT UP
- EXHAUST DUCT DOWN
- RISE(R) OR DROP(D)
- RETURN OR EXHAUST GRILLE, REGISTER
- SUPPLY DIFFUSER, REGISTER, GRILLE
- EXHAUST DIFFUSER, REGISTER, GRILLE
- AD — ACCESS DOOR
- FINTUBE BASEBOARD AND ENCLOSURE
- UNIT HEATER
- TERMINAL UNIT, VARIABLE VOLUME WITH HOT WATER COIL
- TERMINAL UNIT, VARIABLE VOLUME
- PROPELLER FAN
- CENTRIFUGAL FAN
- CO/NO2 — COMBINATION CARBON MONOXIDE / NITROGEN DIOXIDE SENSOR
- INLINE FAN
- DIRECTION OF AIR FLOW
- DIRECTION OF AIR FLOW EXHAUST
- DOOR UNDERCUT
- DOOR LOUVER
- VOLUME DAMPER
- SD — SMOKE DAMPER
- FD — FIRE DAMPER
- MOTORIZED DAMPER, PARALLEL BLADE
- MOTORIZED DAMPER, OPPOSED BLADE
- THERMOSTAT OR THERMISTOR
- HUMIDISTAT
- SWITCH
- SMOKE DETECTOR
- SQUARE ELBOW WITH TURNING VANES
- FLEXIBLE DUCT
- FLEXIBLE CONNECTOR
- ROOF VENTILATOR, EXHAUST
- STARTER/DISCONNECT
- PUMP
- CEILING SUPPLY DIFFUSER W/ THROW DIRECTION SHOWN BY ARROWS (FOR 4-WAY THROW ARROWS NOT SHOWN)
- CEILING PADDLE FAN
- WALL MOUNTED OSCILLATING FAN
- R — REFRIGERANT DETECTOR (C)

PIPING SYMBOLS

- AFS — AIR FLOW SWITCH
- AIR SEPARATOR
- AUTOMATIC AIR VENT WITH ISOLATION VALVE
- BALL VALVE
- BALL VALVE IN VERTICAL
- BOILER DRAIN VALVE W/ HOSE BIB
- BUCKET TRAP
- BUTTERFLY VALVE
- CHECK VALVE
- TRIPLE DUTY VALVE
- COCK
- COMBINATION FLOW MEASURING/ BALANCING VALVE (CIRCUIT SETTER)
- DIRECTION OF FLOW OF PIPE
- DIRT LEG
- END SWITCH
- FLEXIBLE PIPE CONNECTION
- FLOW SWITCH
- FLOAT AND THERMOSTATIC TRAP
- FUSOMATIC VALVE
- GATE VALVE
- THREE WAY VALVE
- GLOBE VALVE
- HOSE BIBB
- LTD — LOW TEMPERATURE DETECTOR (FREEZESTAT)
- MANUAL AIR VENT
- M — METER
- NONELECTRIC ZONE VALVE
- OS&Y VALVE
- OS&Y VALVE IN VERTICAL (PLAN)
- ("PETE'S PLUG")
- PIPE DROP
- PIPE END CAP
- PIPE GUIDE
- DN — PIPE PITCH DOWN IN DIRECTION OF FLOW
- UP — PIPE PITCH UP IN DIRECTION OF FLOW
- PIPE RISE
- PIPE TEE FROM BOTTOM
- PIPE TEE FROM TOP
- PIPE UP TO FINTUBE RADIATION ON FLOOR ABOVE
- PLUG VALVE
- PRESSURE GAUGE W/BALL VALVE (GATE VALVE AND SIPHON FOR STEAM)
- PRESSURE REDUCING VALVE
- PRESSURE REGULATING VALVE
- PRESSURE SWITCH
- REDUCED PRESSURE BACKFLOW PREVENTER
- REDUCER (CONCENTRIC)
- REDUCER (ECCENTRIC-FOB OR FOT)
- SAFETY RELIEF VALVE
- SOLENOID VALVE
- STEAM MONITOR
- STRAINER W/BALL DRAIN VALVE, HOSE BIB AND CAP (GATE VALVE FOR STEAM)
- STRAINER W/ BLOW OFF
- TEMPERATURE SENSOR
- THERMOMETER
- TEMPERATURE/PRESSURE WELL
- STEAM TRAP: F&T - FLOATING AND THERMOSTATIC T - THERMOSTATIC
- THREE-WAY AUTOMATIC CONTROL VALVE (ELECTRIC OR DDC)
- TWO-WAY AUTOMATIC CONTROL VALVE (ELECTRIC OR DDC)
- UNION AS DICTATED BY PIPE SIZE
- FLANGE AS DICTATED BY PIPE SIZE
- VIBRATION ISOLATOR

GENERAL NOTES

1. GENERAL NOTES, SYMBOLS LIST AND DETAILS ARE APPLICABLE TO DRAWINGS MARKED M-XXX.
2. DRAWINGS ARE DIAGRAMMATIC. DETERMINE LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD.
3. COORDINATE WORK OF THIS SECTION WITH THAT OF OTHER SECTIONS.
4. DUCTWORK SHALL BE CONSTRUCTED AND INSTALLED ACCORDING TO LATEST SMACNA STANDARDS FOR STATIC PRESSURE RATING OF APPLICATION.
5. INSTALL THERMOSTATS 4'-6" ABOVE FINISHED FLOOR OR AS DIRECTED OTHERWISE.
6. WORK SHALL BE COORDINATED WITH TRADES INVOLVED. OFFSETS IN PIPING AND DUCTS (INCLUDING DIVIDED DUCTS) AND TRANSITIONS AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
7. VERIFY EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. VERIFY AND PROVIDE DUCT TRANSITIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE DIMENSIONS BEFORE FABRICATION.
8. ACCESS PANELS SHALL BE PROVIDED, WHERE REQUIRED, TO SERVICE DAMPERS, HEATERS, VALVES AND CONCEALED MECHANICAL EQUIPMENT. PROVIDE ACCESS PANELS UP STREAM OF ELBOWS WITH TURNING VANES.
9. INSTALL EQUIPMENT, PIPING AND DUCTWORK AS REQUIRED TO PROVIDE A VIBRATION-FREE INSTALLATION AND TO FACILITATE EQUIPMENT ACCESS AS REQUIRED BY EQUIPMENT MANUFACTURER.
10. CONTROL WIRE AND CONDUIT SHALL COMPLY WITH NFPA 70 AND PROJECT SPECIFICATIONS.
11. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR LOCATIONS OF AIR DEVICES WHERE APPLICABLE.
12. PROVIDE FLEXIBLE DUCT CONNECTIONS ON DUCTS CONNECTING TO FANS OR FAN SECTION OF AHUS, ERV, DOAS. DUCTS TO BE GROUNDED ACROSS FLEXIBLE CONNECTION WITH FLEXIBLE COPPER GROUNDING STRAPS. (C)
13. INSULATE PIPING AS SPECIFIED. PERFORM PIPING SYSTEM TESTS SPECIFIED BEFORE INSULATING.
14. PROVIDE CLAMPS, OFFSETS, EXPANSION JOINTS, ANCHORS AND GUIDES AS NECESSARY TO PREVENT STRESS ON PIPING.
15. ALL MECHANICAL INSTALLATIONS AND WORK SHALL BE IN ACCORDANCE WITH MAINE UNIFORM BUILDING CODE & ENERGY CODES (MUBEC) INCLUDING IBC-2015, IMC-2015, MAINE PLUMBING CODE, AND ANY OTHER APPLICABLE CODES AND STANDARDS AS REQUIRED BY THE STATE OF MAINE.
16. SUPPLY AIR DIFFUSERS SHALL BE CONNECTED USING DIFFUSER PLENUM AND RUNOUTS SHALL BE PROVIDED WITH MANUAL VOLUME DAMPER IN ACCESSIBLE LOCATION UPSTREAM OF FLEXIBLE CONNECTION PER DETAIL A1 ON M-501 (TYP.) (C)

GENERAL SYMBOLS

- C5 / M-501 — DETAIL NUMBER; DRAWING WHERE DETAIL IS DRAWN
- D1 — DETAIL NUMBER
- XXX-XXX (xxx) — SYMBOL PER ABBREVIATION LIST; EQUIPMENT SEQUENCE NUMBER; NOTE
- S- / ### / X3 — DIFFUSER, REGISTER OR GRILLE SEQUENCE NUMBER; CFM; NOTE
- FR-1 / 2.2 / 5 LF — FINTUBE DESIGNATION; MBH; LENGTH OF ACTIVE FIN TUBE
- GPM
- 22 — KEY NOTE (NUMBER)
- REVISION (LETTER)
- CONNECT TO EXISTING
- LIMIT OF DEMOLITION

MECHANICAL LINETYPE LEGEND

- ITEMS TO BE REMOVED
- EXIST ITEMS TO REMAIN
- NEW WORK
- HIDDEN ITEMS
- CONTROL WIRING

MODELED DUCTWORK LEGEND

- 24"Ø SA — SUPPLY AIR ROUND DUCT RISE
- 24"Ø RA — RETURN AIR ROUND DUCT RISE
- 24"Ø EA — EXHAUST AIR ROUND DUCT RISE
- 24"Ø SA — SUPPLY AIR ROUND DUCT DROP
- 24"Ø RA — RETURN AIR ROUND DUCT DROP
- 24"Ø EA — EXHAUST AIR ROUND DUCT DROP
- 24"x24" SA — SUPPLY AIR RADIUS ELBOW RISE
- 24"x24" RA — RETURN AIR RADIUS ELBOW RISE
- 24"x24" EA — EXHAUST AIR RADIUS ELBOW RISE
- 24"x24" SA — SUPPLY AIR RADIUS ELBOW DROP
- 24"x24" RA — RETURN AIR RADIUS ELBOW DROP
- 24"x24" EA — EXHAUST AIR RADIUS ELBOW DROP
- 24"x24" SA — SUPPLY AIR MITERED ELBOW RISE
- 24"x24" RA — RETURN AIR MITERED ELBOW RISE
- 24"x24" EA — EXHAUST AIR MITERED ELBOW RISE
- 24"x24" SA — SUPPLY AIR MITERED ELBOW DROP
- 24"x24" RA — RETURN AIR MITERED ELBOW DROP
- 24"x24" EA — EXHAUST AIR MITERED ELBOW DROP
- RECTANGULAR / ROUND VOLUME DAMPER
- RECTANGULAR / ROUND CONTROL DAMPER
- RECTANGULAR MANUAL CONTROL DAMPER
- RECTANGULAR MANUAL CONTROL DAMPER OPPOSED BLADES
- RECTANGULAR MANUAL CONTROL DAMPER PARALLEL BLADES
- ROUND OR SQUARE DUCT REDUCER
- DUCT END CAP
- FLEX DUCT
- SUPPY DIFFUSER
- RETURN GRILLE
- EXHAUST GRILLE

MODELED PIPING LEGEND

- GLOBE VALVE
- CHECK VALVE
- BALL VALVE
- PRESSURE RELIEF VALVE
- STRAINER W/BLOW OFF
- UNION
- BACKFLOW PREVENTER
- REDUCER (CENTRIC)
- PIPE ELBOW UP
- PIPE ELBOW DOWN
- PIPE TEE UP
- PIPE TEE DOWN
- BUTTERFLY VALVE
- GATE VALVE
- PIPE END CAP
- PIPE PITCH

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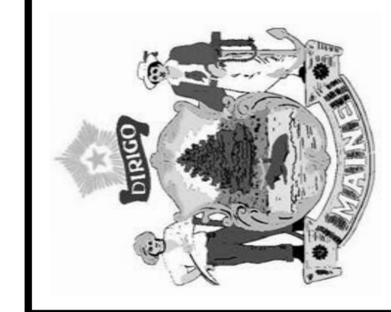

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(207) 624-7314

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

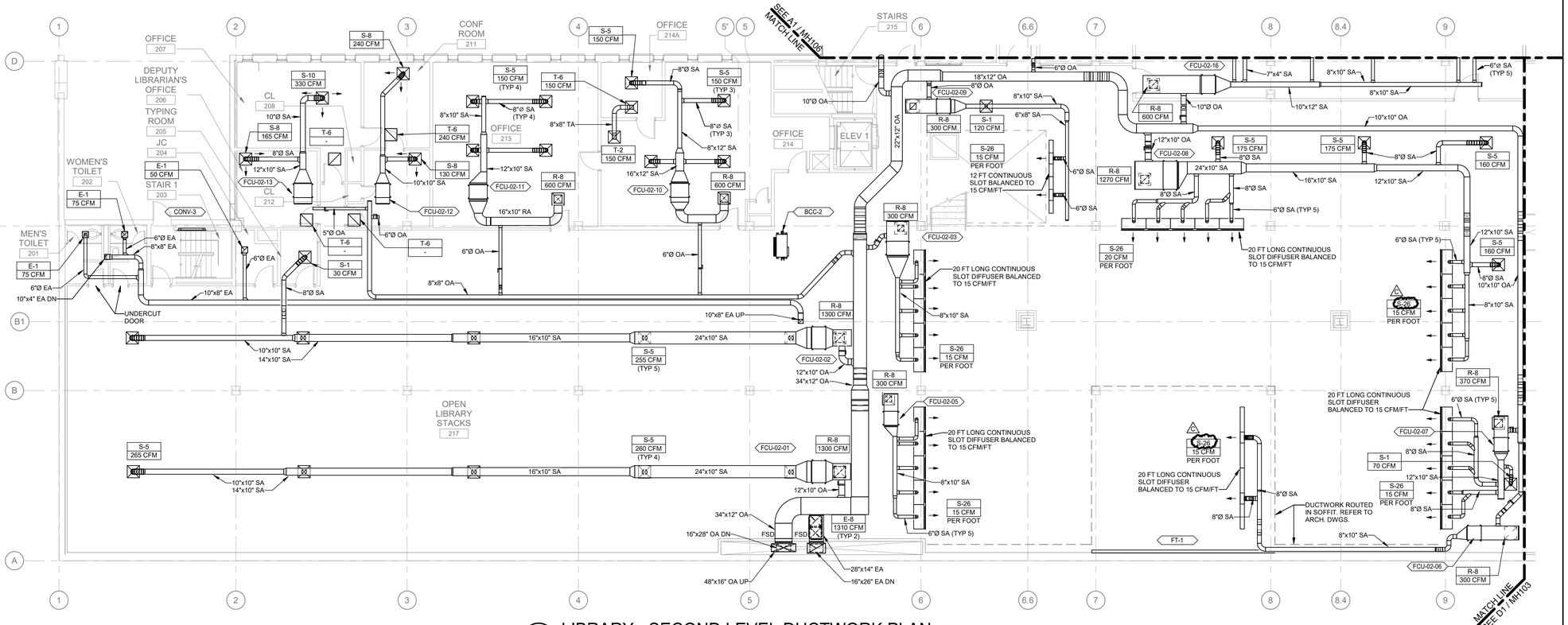
REV.	REVISION ISSUE DESCRIPTION	DATE
C	ADDENDUM NO.3	02-17-2022
B	ADDENDUM NO. 2	02-08-2022
A	ISSUED FOR BID	01-07-2022

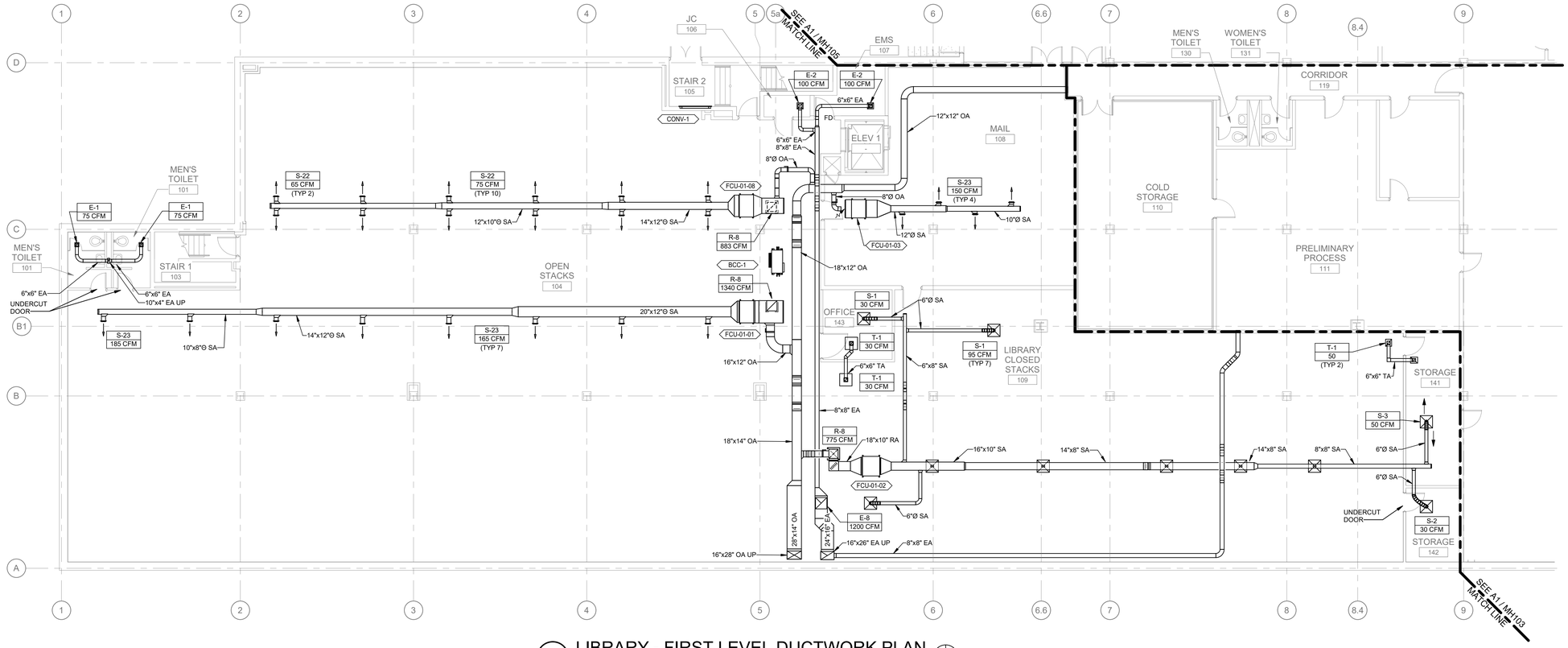
PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	SMM
DESIGNED BY:	BAL
DRAWN BY:	BAL

SHEET TITLE:
MECHANICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES

SHEET ID:
M-001

NOT FOR CONSTRUCTION





D1 LIBRARY - SECOND LEVEL DUCTWORK PLAN

1/8" = 1'-0"

A1 LIBRARY - FIRST LEVEL DUCTWORK PLAN

1/8" = 1'-0"

NOTES

1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.
2. WHERE DUCTWORK PASSES THROUGH A FLOOR SLAB, PROVIDE A FIRE DAMPER UNLESS OTHERWISE NOTED.
3. WHERE DUCTWORK IS EXPOSED, IT SHALL BE DOUBLE WALL, SPIRAL SEAMED FLAT OVAL OR ROUND.

KEY PLAN

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STEVEN M. MARTEL
2/17/2022
7148

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PROJECT MANAGER:	KFM
A/E OF RECORD:	SMM
DESIGNED BY:	SMM
DRAWN BY:	BAL

SHEET TITLE:
LIBRARY - FIRST AND SECOND LEVEL DUCTWORK PLANS

SHEET ID:
MH101

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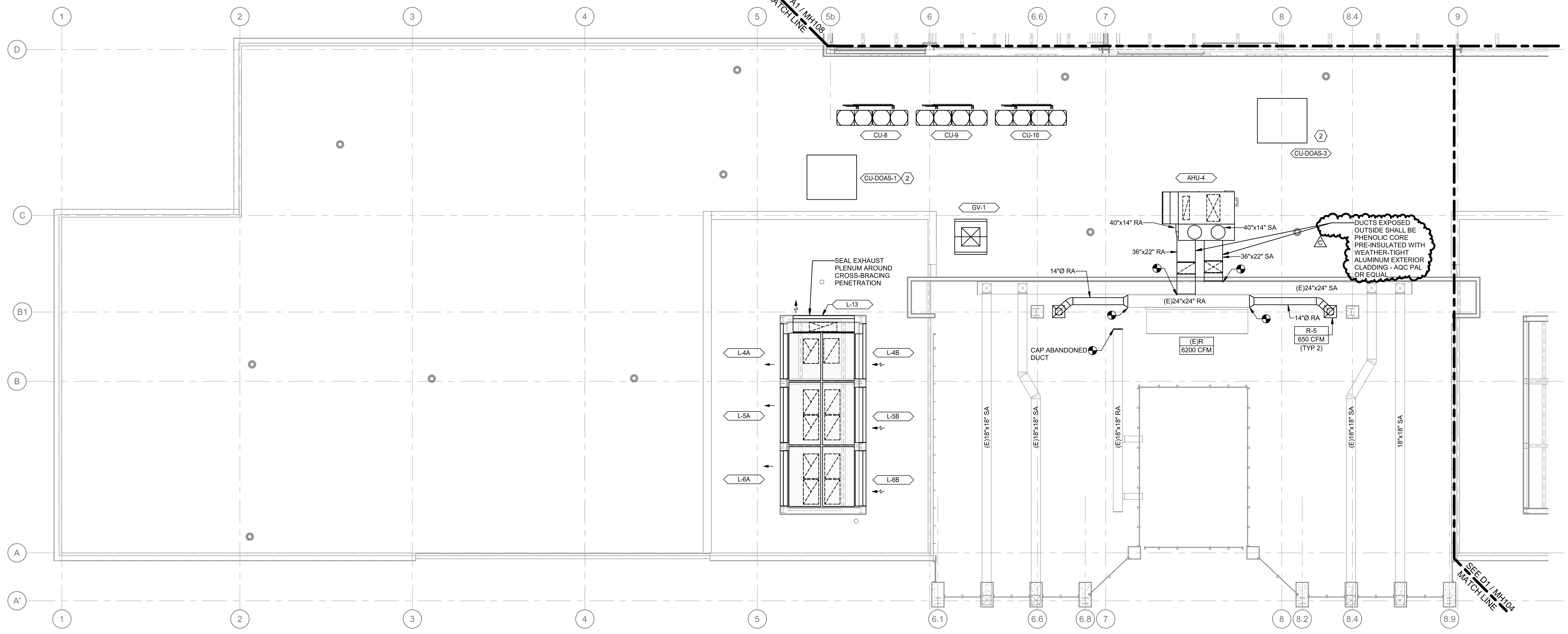
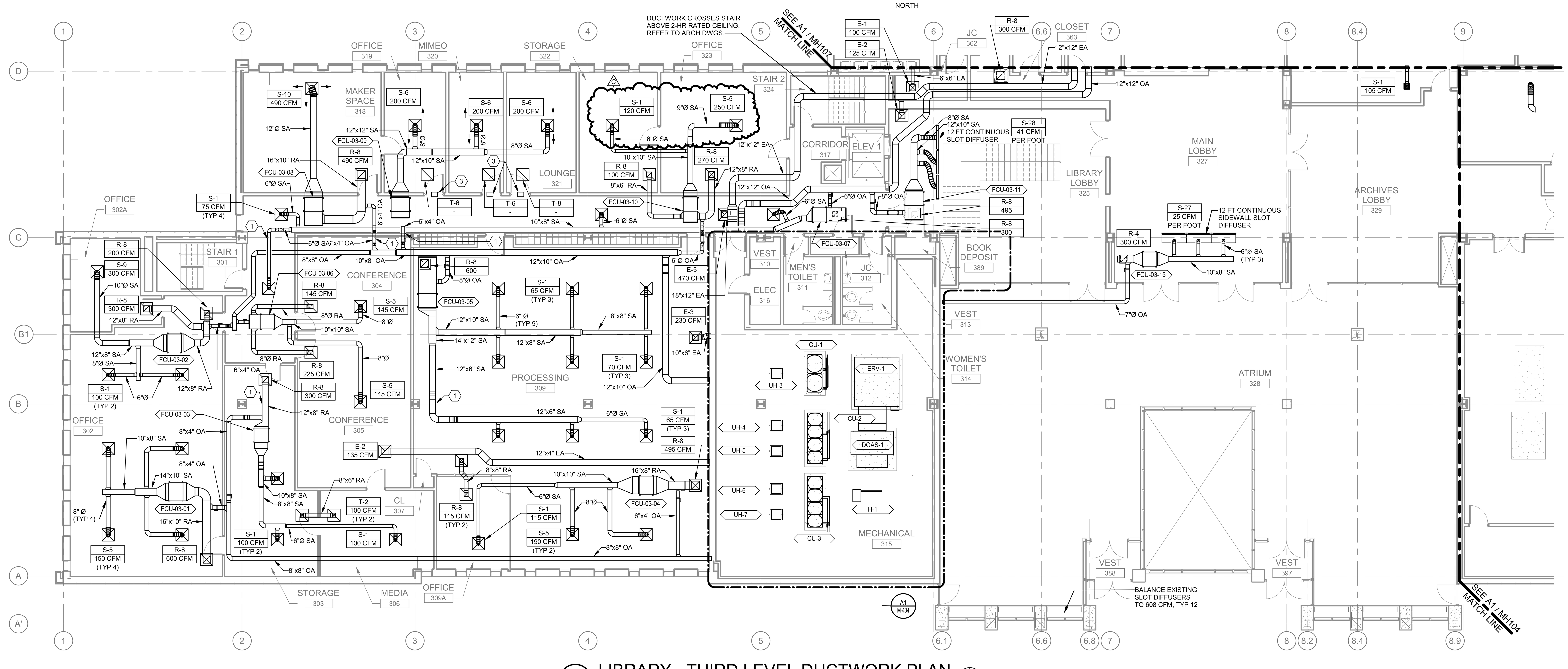


D1 LIBRARY - ROOF DUCTWORK PLAN

1/8" = 1'-0"

PLAN NORTH



A1 LIBRARY - THIRD LEVEL DUCTWORK PLAN

1/8" = 1'-0"

PLAN NORTH

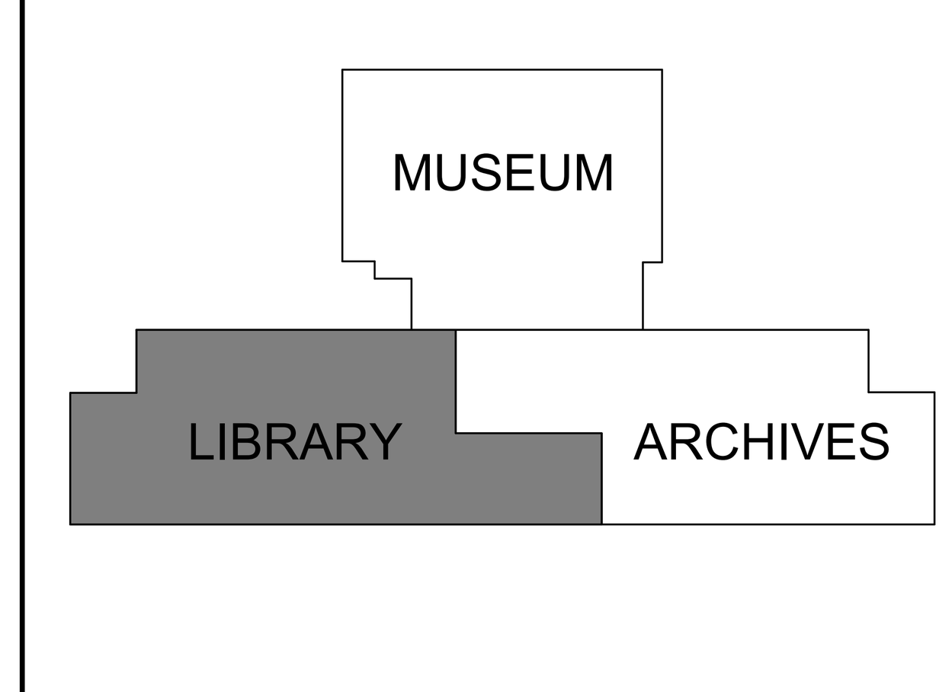
NOTES

1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.

KEYED NOTES

1. DUCT THROUGH (E) OPENING IN BEAM
2. ARCHITECTURAL TO PROVIDE CURBS
3. 12"x8" OPENING IN WALL ABOVE CEILING.

KEY PLAN



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STATE OF MAINE — STEVEN M. MARTEL — 7148 — LICENSED — PROFESSIONAL ENGINEER — 2/17/2022

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PROJECT MANAGER:	KFM
A/E OF RECORD:	SMM
DESIGNED BY:	SMM
DRAWN BY:	BAL

SHEET TITLE:
LIBRARY THIRD LEVEL AND ROOF DUCTWORK PLAN

SHEET ID:
MH102

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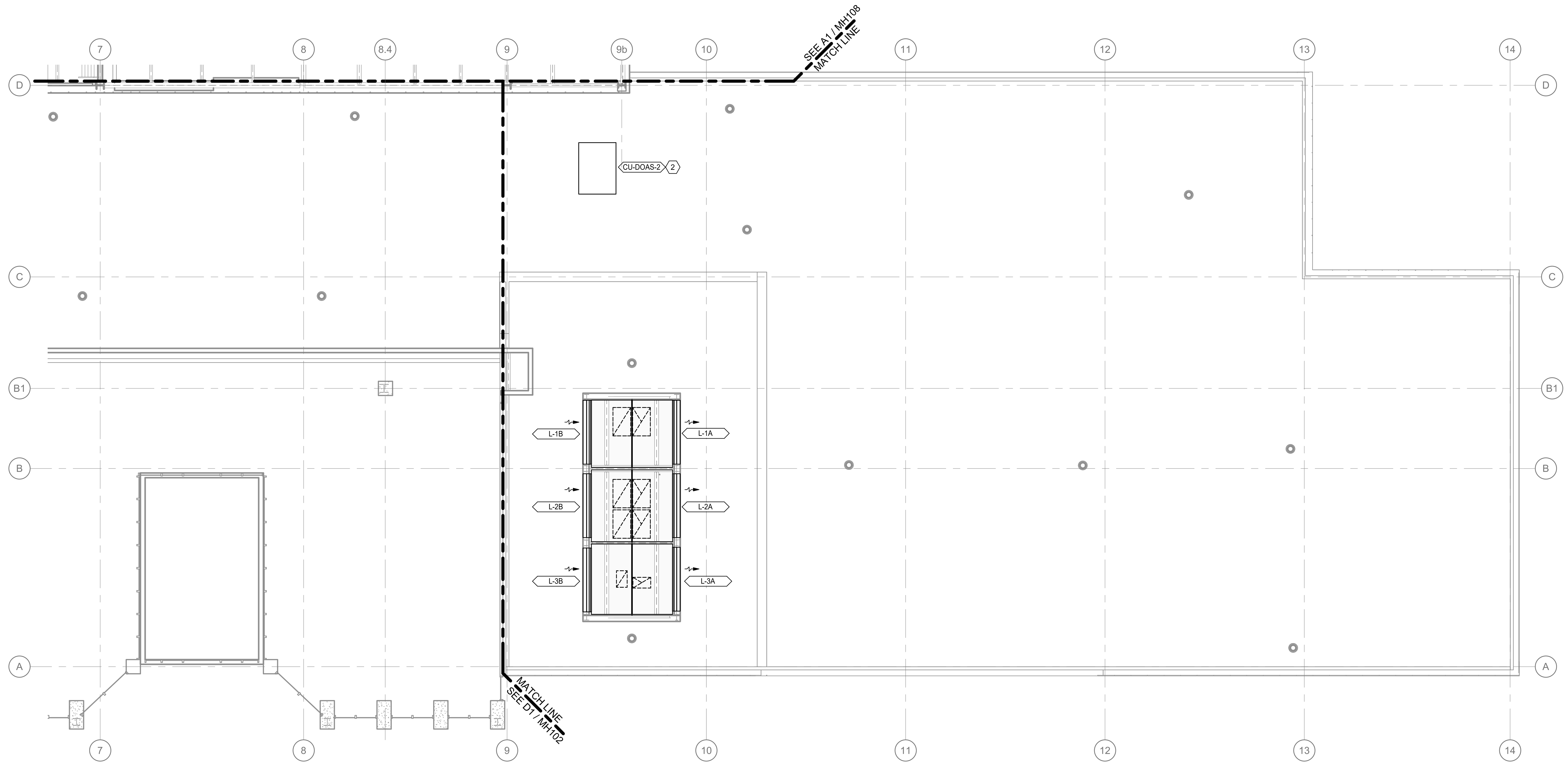
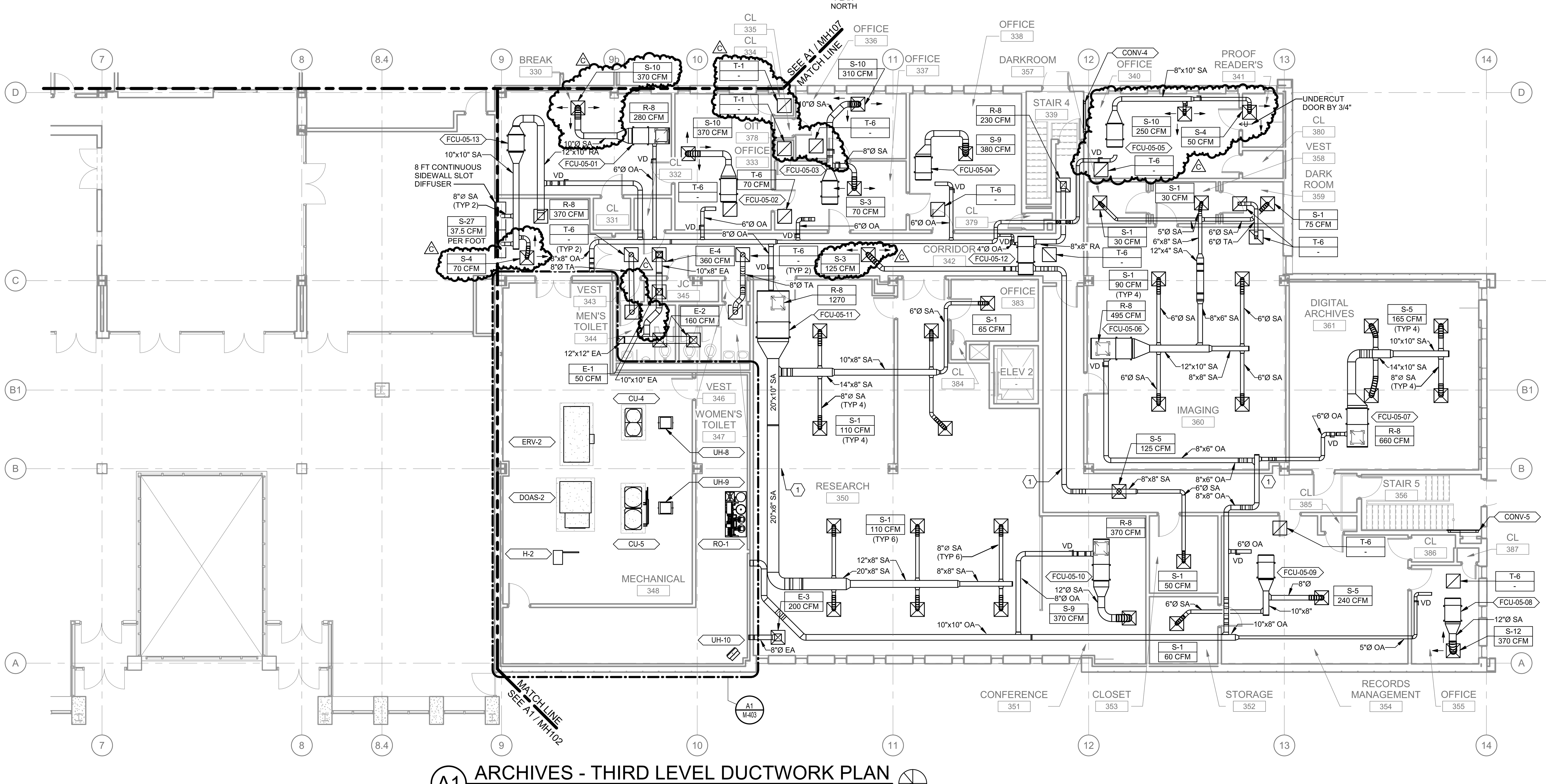


D1 ARCHIVES - ROOF DUCTWORK PLAN
1/8" = 1'-0"
PLAN NORTH



A1 ARCHIVES - THIRD LEVEL DUCTWORK PLAN
1/8" = 1'-0"
PLAN NORTH

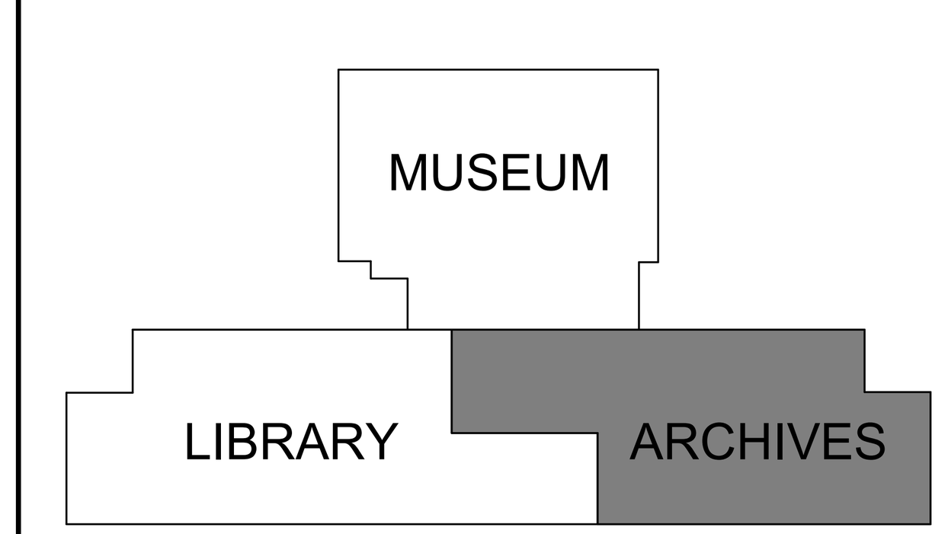
NOTES

1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.

KEYED NOTES

1. DUCT THROUGH (E) OPENING IN BEAM
2. ARCHITECTURAL TO PROVIDE CURBS

KEY PLAN



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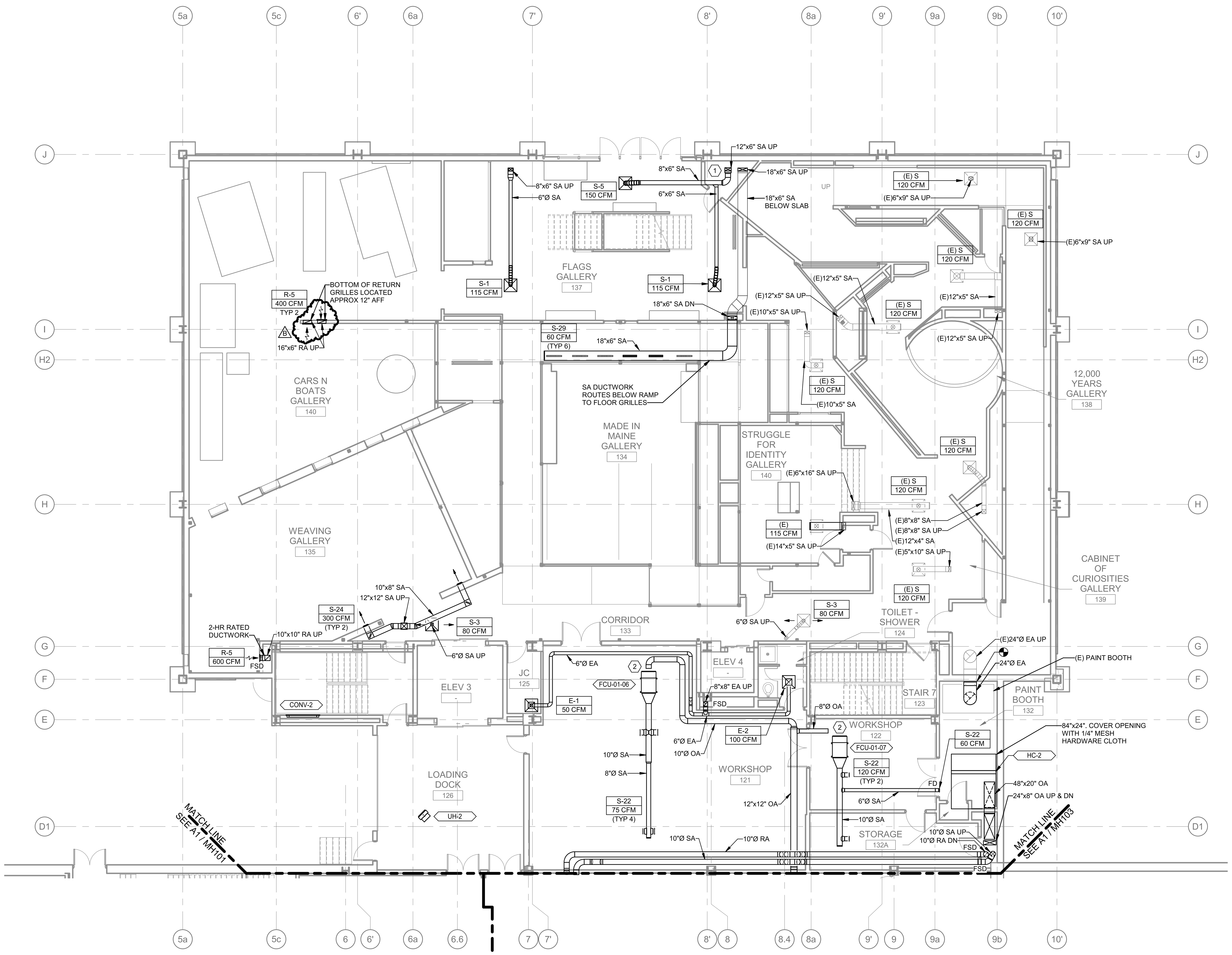
A/E OF RECORD:	SMM
DESIGNED BY:	SMM
DRAWN BY:	BAL

SHEET TITLE:
ARCHIVES - THIRD LEVEL AND ROOF DUCTWORK PLAN

SHEET ID:
MH104

NOT FOR CONSTRUCTION



A1 MUSEUM - FIRST LEVEL DUCTWORK PLAN

1/8" = 1'-0"

0 4' 8' 16'

PLAN NORTH

NOTES

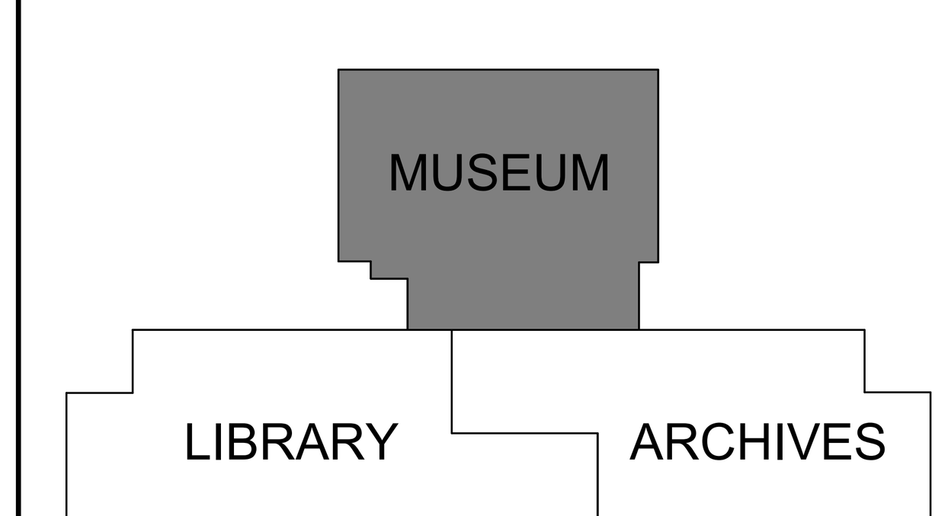
1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.
2. COORDINATE LOCATION OF SLOT DIFFUSERS IN CARS AND BOATS GALLERY WITH EXHIBIT ITEMS TO ALLOW UNIMPEDED AIRFLOW TO THE FLOOR.
3. WHERE DUCTWORK IS EXPOSED, IT SHALL BE DOUBLE WALL, SPIRAL SEAMED FLAT OVAL OR ROUND.

KEYED NOTES

1 DUCT THROUGH (E) OPENING IN BEAM

2 DIRECT RETURN

KEY PLAN



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SHEET TITLE:
MUSEUM - FIRST LEVEL DUCTWORK PLAN

SHEET ID:
MH105

NOT FOR CONSTRUCTION

NOTES

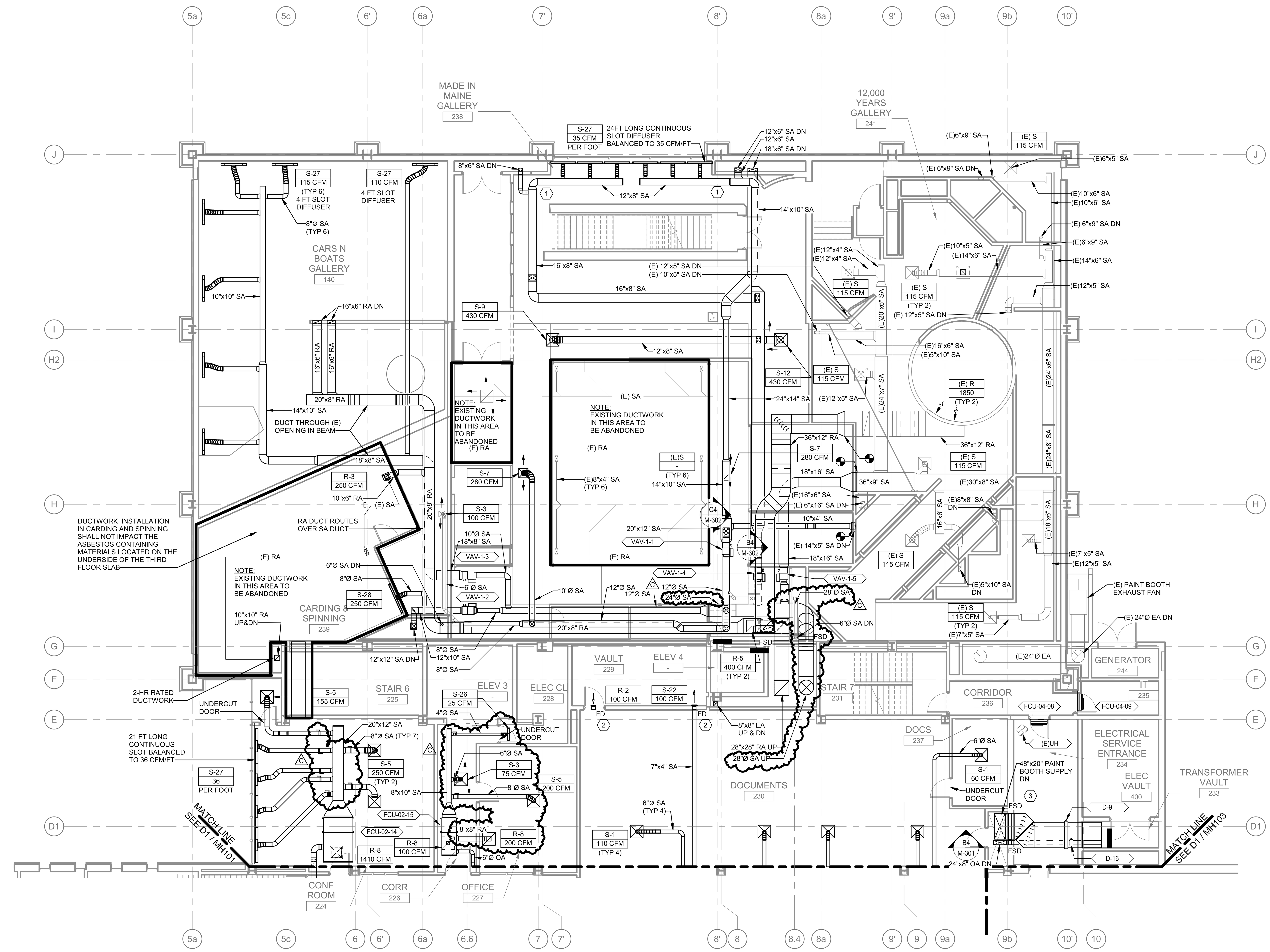
1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.
2. COORDINATE LOCATION OF SLOT DIFFUSERS IN CARS AND BOATS GALLERY WITH EXHIBIT ITEMS TO ALLOW UNIMPEDED AIRFLOW TO THE FLOOR.
3. WHERE DUCTWORK IS EXPOSED, IT SHALL BE DOUBLE WALL, SPIRAL SEAMED FLAT OVAL OR ROUND.

KEYED NOTES

1 DUCT PASSES THROUGH EXISTING OPENING IN BEAM.

2 3-HR RATED FIRE DAMPER

3 3-HR RATED FIRE DAMPER

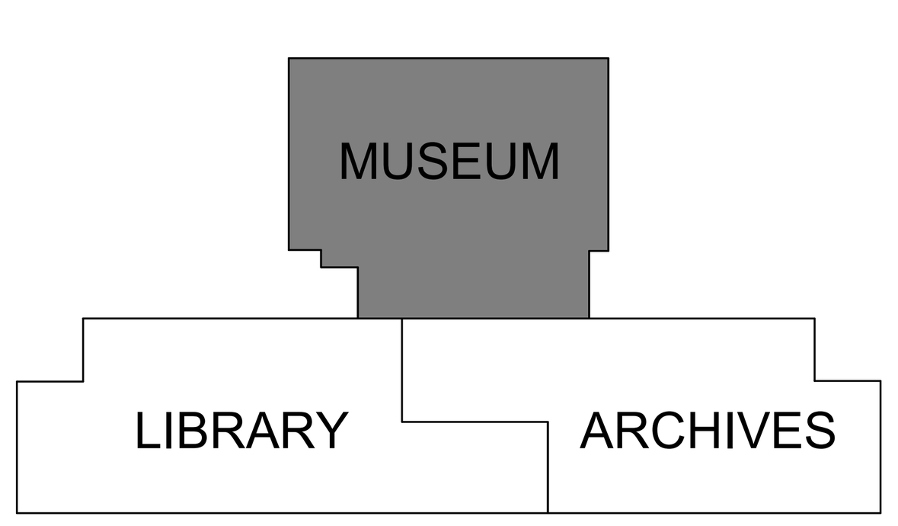


A1 MUSEUM - SECOND LEVEL DUCTWORK PLAN

1/8" = 1'-0"

PLAN NORTH

KEY PLAN



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SHEET TITLE:

MUSEUM - SECOND LEVEL DUCTWORK PLAN

SHEET ID:

MH106

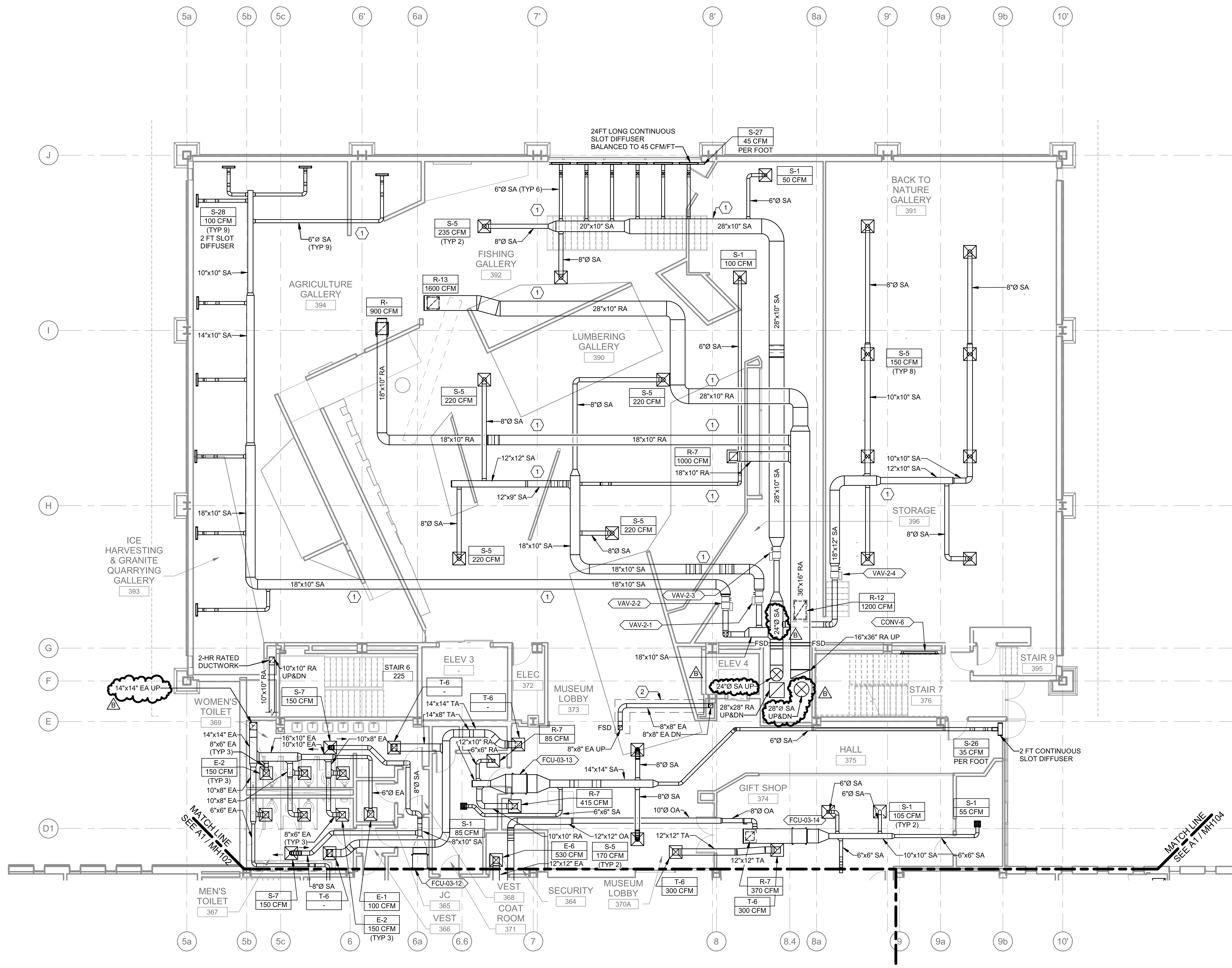
NOT FOR CONSTRUCTION

NOTES

1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.

KEYED NOTES

1. DUCT PASSES THROUGH EXISTING OPENING IN BEAM.
2. PROVIDE 2-HR SHAFT RATED ENCLOSURE AROUND THE EXHAUST DUCT FROM THE VERTICAL SHAFT TO PENETRATION OF THE FOURTH FLOOR SLAB ABOVE.



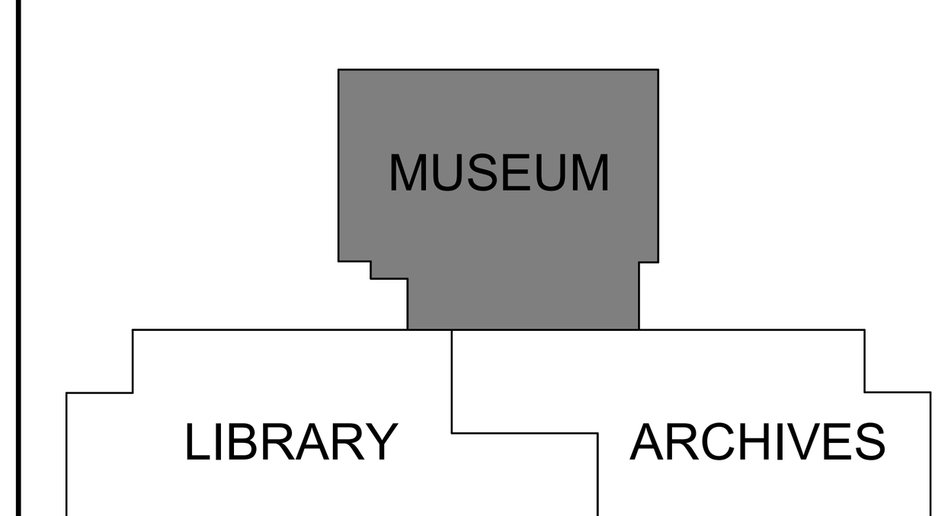
A1 MUSEUM - THIRD LEVEL DUCTWORK PLAN

1/8" = 1'-0"

0 4' 8' 16'

PLAN NORTH

KEY PLAN



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DRAWN BY:	BAL

SHEET TITLE:
MUSEUM - THIRD LEVEL DUCTWORK PLAN

SHEET ID:
MH107

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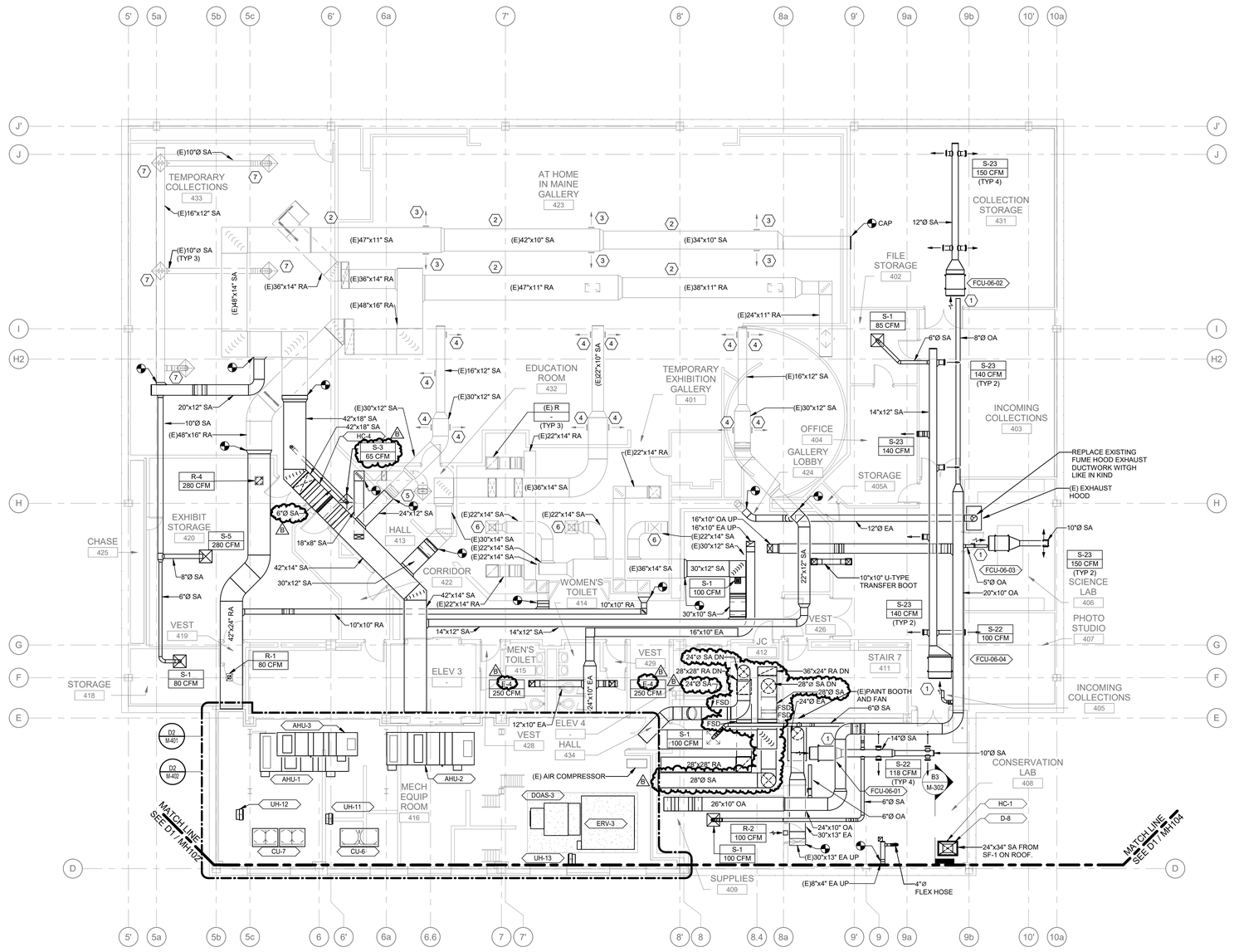

A1 MUSEUM - FOURTH LEVEL DUCTWORK PLAN

1/8" = 1'-0"

0 4' 8' 16'

PLAN NORTH

NOTES

1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.

⬡ KEYED NOTES

1 DIRECT RETURN
2 DUCT PASSES THROUGH EXISTING OPENING IN BEAM.
3 REBALANCE EXISTING DIFFUSER TO 240 CFM
4 REBALANCE EXISTING DIFFUSER TO 70 CFM
5 REBALANCE EXISTING DIFFUSER TO 50 CFM
6 REBALANCE EXISTING DIFFUSER TO 140 CFM
7 REBALANCE EXISTING DIFFUSER TO 225 CFM

KEY PLAN

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JANUARY 7, 2022

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STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

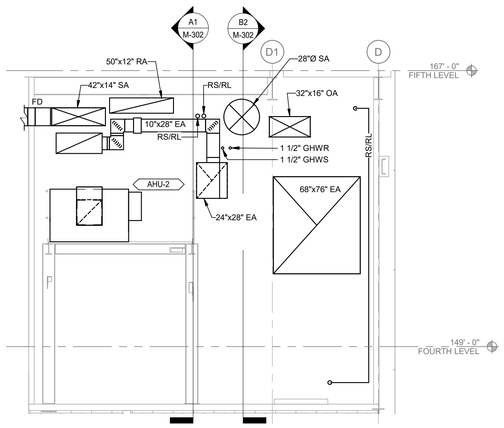
REV	REVISION ISSUE DESCRIPTION	DATE
B	ADDENDUM NO.3	02-17-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO: 3618208720
PROJECT MANAGER: KFM
A/E OF RECORD: SMM
DESIGNED BY: SMM
DRAWN BY: BAL

SHEET TITLE:
MUSEUM - FOURTH LEVEL DUCTWORK PLAN

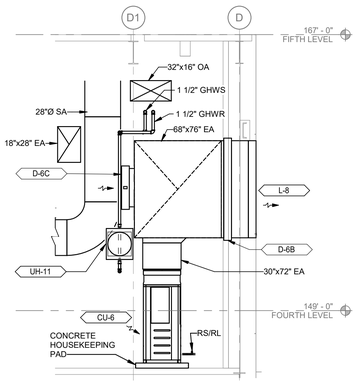
SHEET ID:
MH108

NOT FOR CONSTRUCTION



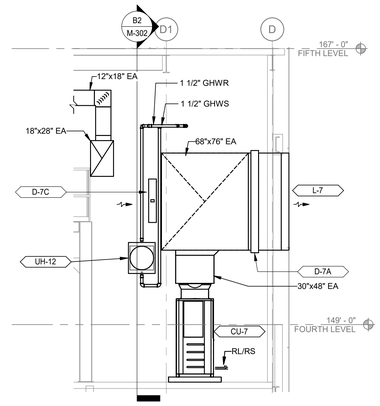
C1 AHU-2 SECTION

1/4" = 1'-0"



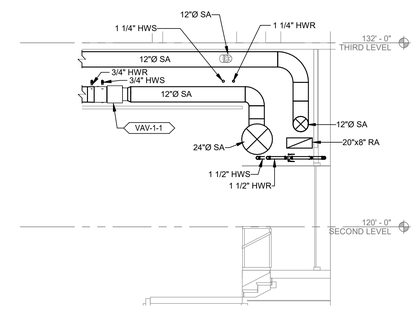
C2 CU-6 SECTION

1/4" = 1'-0"



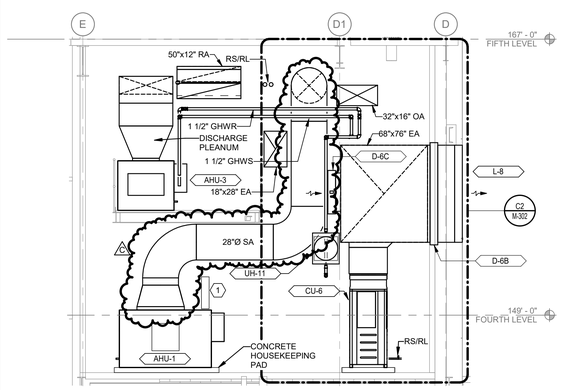
C3 CU-7 SECTION

1/4" = 1'-0"



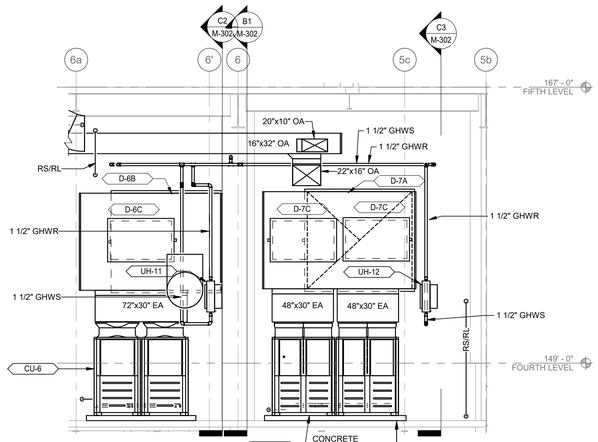
C4 VAV-1-1 SECTION

1/4" = 1'-0"



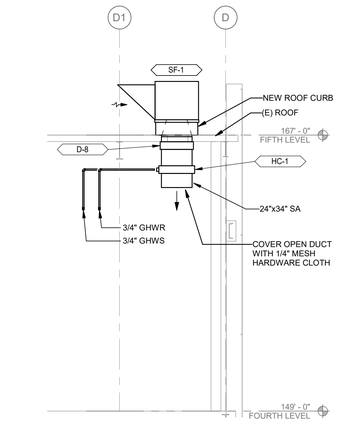
B1 AHU-1,3 SECTION

1/4" = 1'-0"



B2 CU-6,7 SECTION

1/4" = 1'-0"

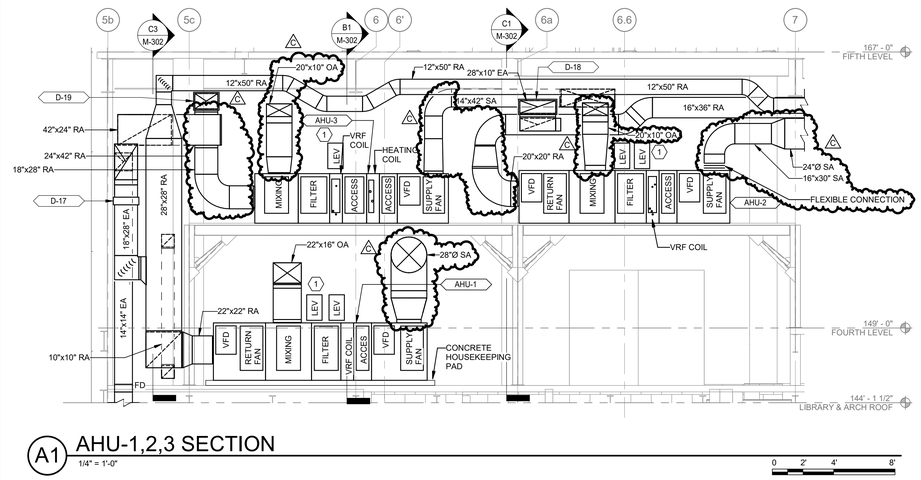


B3 SF-1 SECTION

1/4" = 1'-0"

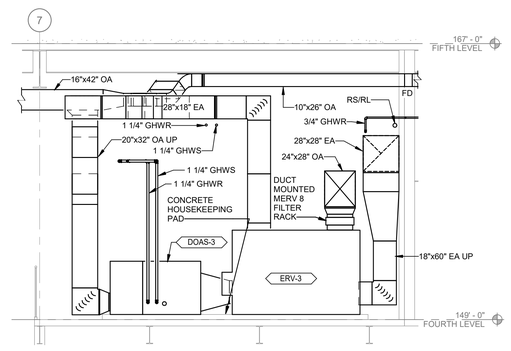
B4 VAV-1-4, 1-5 SECTION

1/4" = 1'-0"



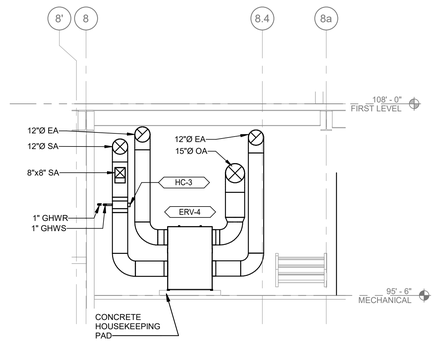
A1 AHU-1,2,3 SECTION

1/4" = 1'-0"



A2 ERV-3 AND DOAS-3 SECTION

1/4" = 1'-0"



A3 ERV-4 SECTION

1/4" = 1'-0"

NOTES

1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.
2. DUCTWORK, PIPING, AND EQUIPMENT SHALL BE ROUTED TO PROVIDE MIN. 6'-8" CLEARANCE ALONG ACCESS PATHS IN MECHANICAL ROOMS.
3. SEE FLOW DIAGRAMS ON M-705 AND PIPING DETAILS ON M-502, M-503 AND M-504 FOR DETAILD PIPING CONNECTIONS, VALVES AND ACCESSORIES.
4. PROVIDE DRAIN PAN FOR CU's AND ROUTE 1" CONDENSATE TO NEAREST FLOOR DRAIN.

⬡ KEYED NOTES

1 LEV CONTROL PANELS MOUNTED ON TOP OF AHU FILTER SECTION USING UNI-CHANNEL TYPE SUPPORTS.

wood.
Environment & Infrastructure Solutions, Inc.
511 Congress St., Suite 200, Portland, ME 04101
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STATE OF MAINE
BUREAU OF GENERAL SERVICES
111 SEWALL STREET, 4TH FLOOR
AUGUSTA, MAINE 04333-0077
(207) 624-7314

STEVEN M. MARTEL 2-17-2022 7148 LICENSED PROFESSIONAL ENGINEER

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
C	ADDENDUM NO.3	02-17-2022
B	ADDENDUM NO. 2	02-08-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	SMM
DESIGNED BY:	SMM
DRAWN BY:	BAL

SHEET TITLE:
MECHANICAL SECTIONS

SHEET ID:
M-302

NOT FOR CONSTRUCTION

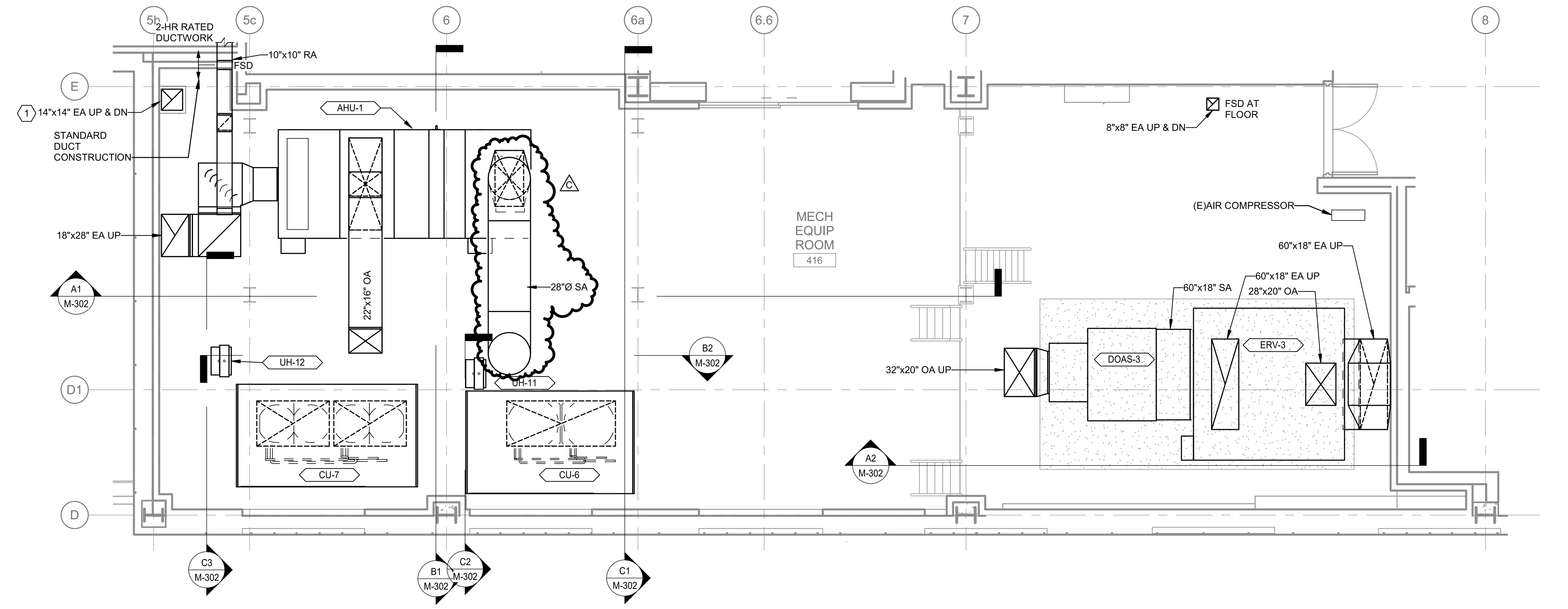
BIM 360://3618208720 - ME Cultural Building Mechanical Upgrades/M302_MP_2021.rvt

NOTES

1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.
2. DUCTWORK, PIPING, AND EQUIPMENT SHALL BE ROUTED TO PROVIDE MIN. 6'-8" CLEARANCE ALONG ACCESS PATHS IN MECHANICAL ROOMS.
3. SEE FLOW DIAGRAMS ON M-705 AND PIPING DETAILS ON M-502, M-503 AND M-504 FOR DETAILD PIPING CONNECTIONS, VALVES AND ACCESSORIES.
4. PROVIDE DRAIN PAN FOR CU's AND ROUTE 1" CONDENSATE TO NEAREST FLOOR DRAIN.

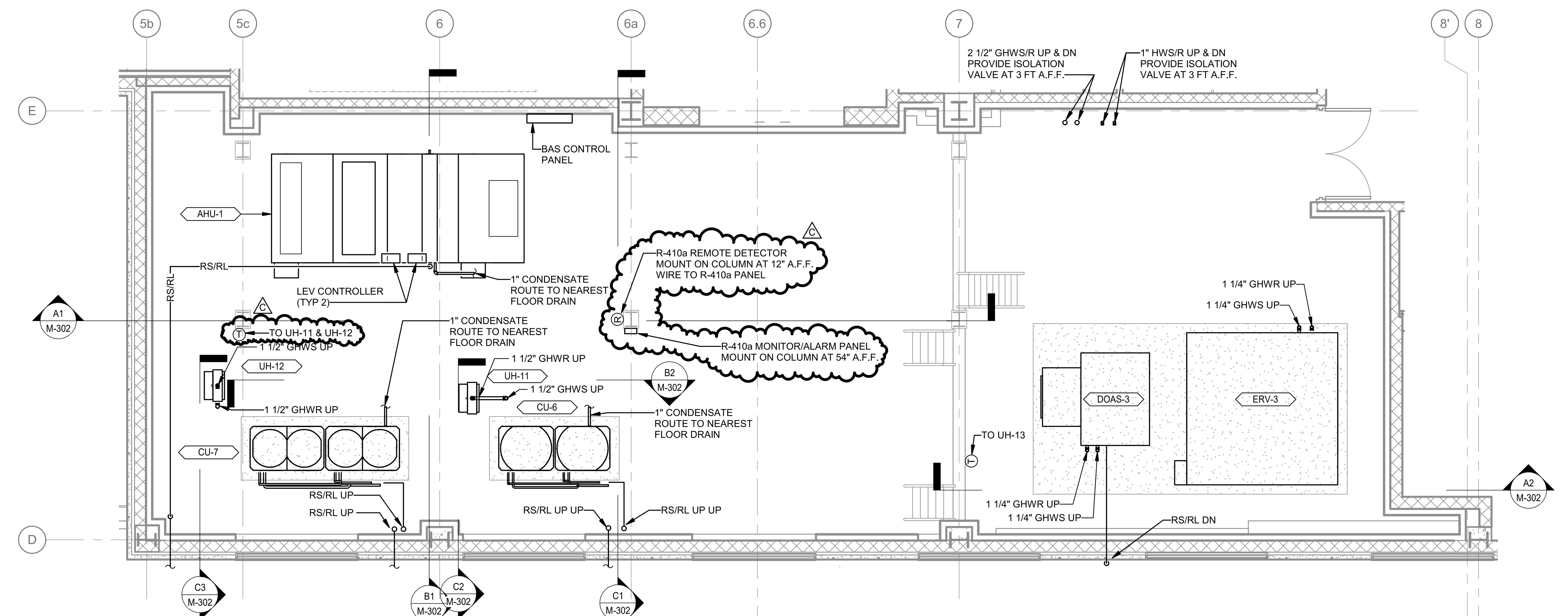
KEYED NOTES

1 FIRE DAMPER AT SLAB PENETRATION



D2 MUSEUM - FOURTH LEVEL MECHANICAL 416 LOWER DUCTWORK PART PLAN

1/4" = 1'-0"



A3 MUSEUM - FOURTH LEVEL MECHANICAL 416 LOWER PIPING PART PLAN

1/4" = 1'-0"

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PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	SMM
DESIGNED BY:	SMM
DRAWN BY:	BAL

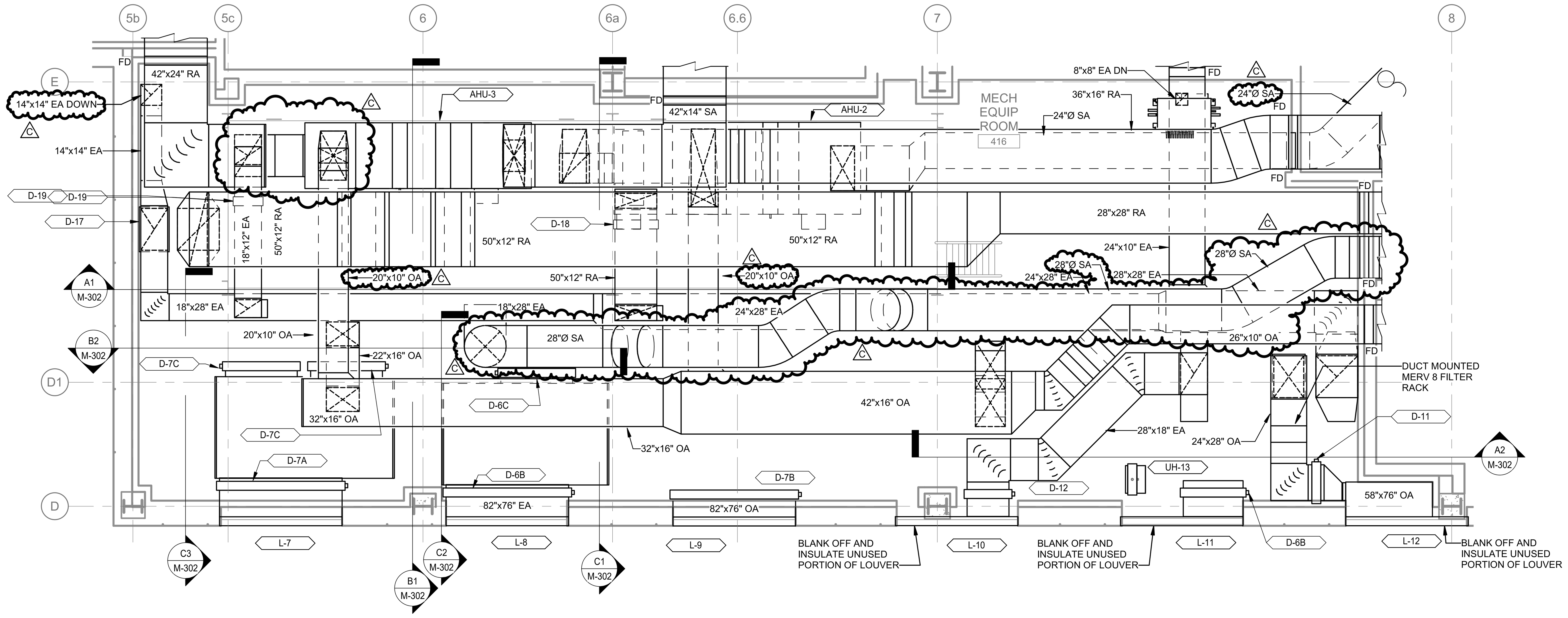
SHEET TITLE:
MECHANICAL PART PLANS

SHEET ID:
M-401

NOT FOR CONSTRUCTION

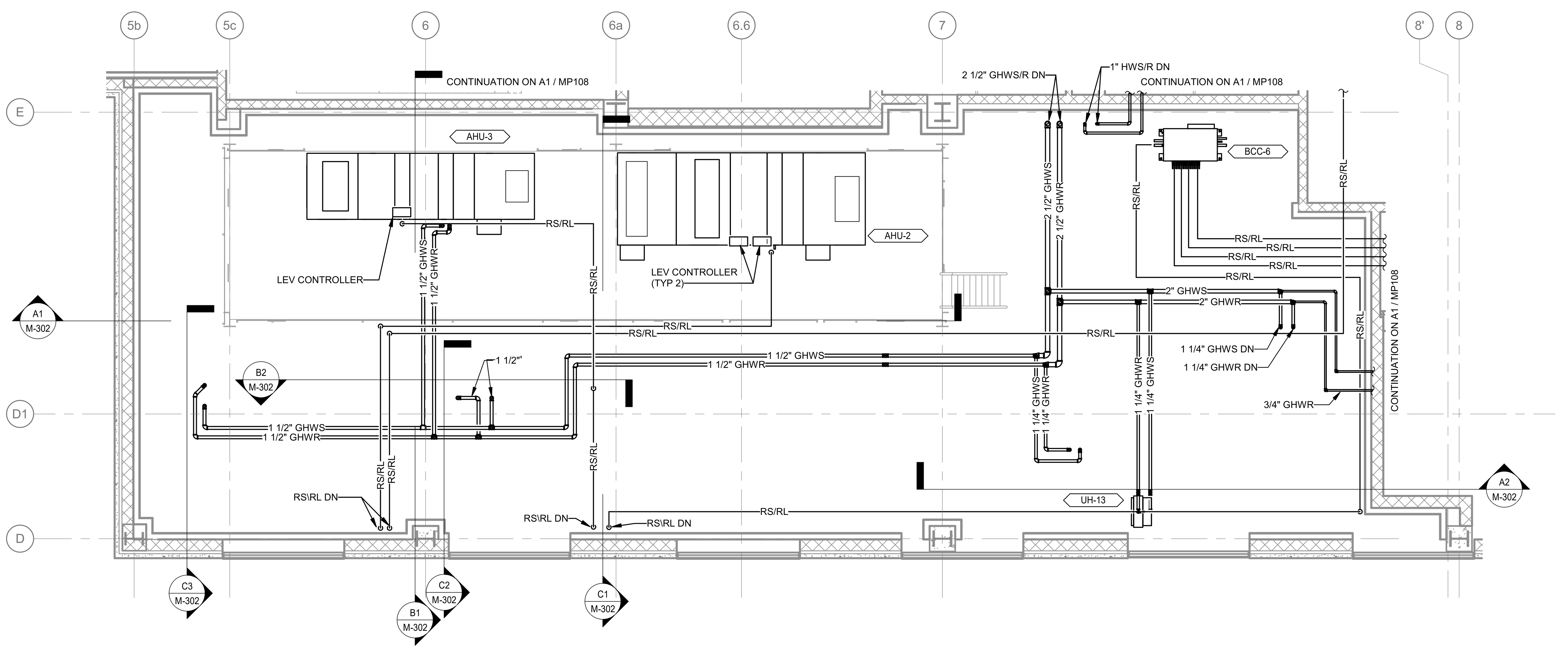
NOTES

1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.
2. DUCTWORK, PIPING, AND EQUIPMENT SHALL BE ROUTED TO PROVIDE MIN. 6'-8" CLEARANCE ALONG ACCESS PATHS IN MECHANICAL ROOMS.
3. SEE FLOW DIAGRAMS ON M-705 AND PIPING DETAILS ON M-502, M-503 AND M-504 FOR DETAILD PIPING CONNECTIONS, VALVES AND ACCESSORIES.
4. PROVIDE DRAIN PAN FOR CU's AND ROUTE 1" CONDENSATE TO NEAREST FLOOR DRAIN.



D2 MUSEUM - FOURTH LEVEL MECHANICAL 416 UPPER DUCTWORK PART PLAN

1/4" = 1'-0"



A1 MUSEUM - FOURTH LEVEL MECHANICAL 416 UPPER PIPING PART PLAN

1/4" = 1'-0"

wood.

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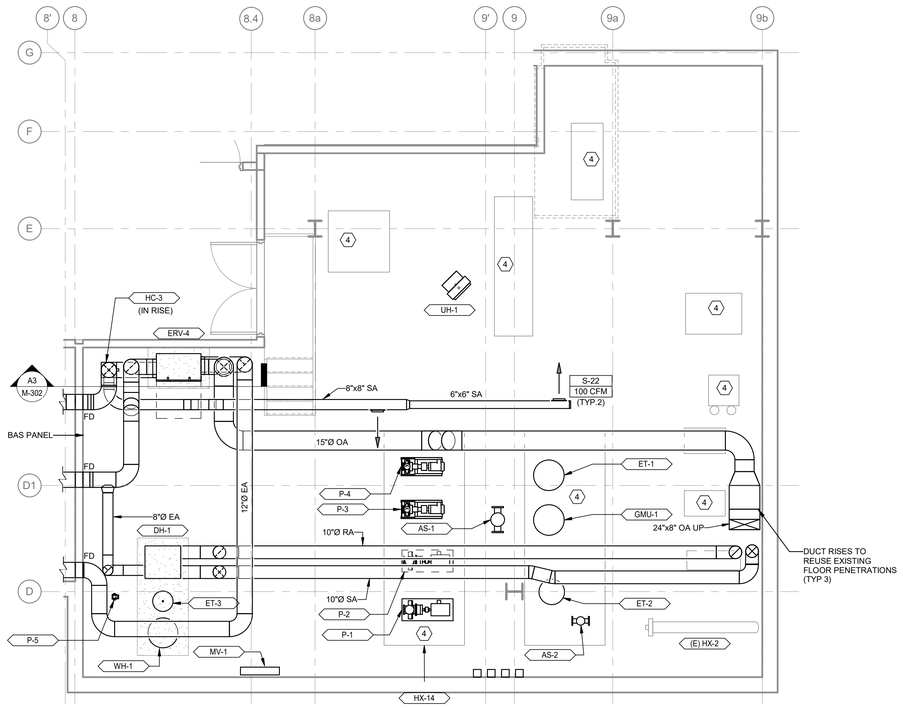
PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	SMM
DESIGNED BY:	SMM
DRAWN BY:	BAL

SHEET TITLE:
MECHANICAL PART PLANS

SHEET ID:
M-402

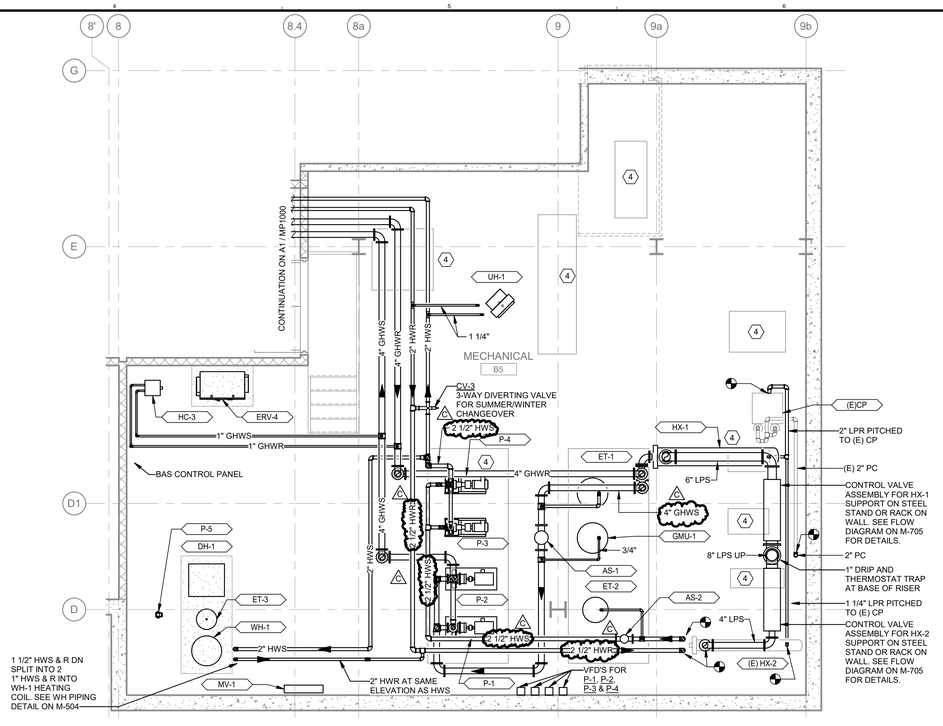
NOT FOR CONSTRUCTION



D1 MECHANICAL ROOM B5 DUCTWORK PLAN

1/4" = 1'-0"

0 2' 4' 8'



D4 MECHANICAL ROOM B5 PIPING PART PLAN

1/4" = 1'-0"

0 2' 4' 8'

A1 ARCHIVES - THIRD LEVEL MECHANICAL 348 DUCTWORK PART PLAN

1/4" = 1'-0"

0 2' 4' 8'

A4 ARCHIVE - THIRD LEVEL MECHANICAL 348 PIPING PART PLAN

1/4" = 1'-0"

0 2' 4' 8'

NOTES

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3. SEE FLOW DIAGRAMS ON M-705 AND PIPING DETAILS ON M-502, M-503 AND M-504 FOR DETAILD PIPING CONNECTIONS, VALVES AND ACCESSORIES.
4. PROVIDE DRAIN PAN FOR CU's AND ROUTE 1" CONDENSATE TO NEAREST FLOOR DRAIN.

⬡ KEYED NOTES

1 48"x30" OA UP
2 48"x30" EA UP
3 FIRE DAMPER AT SLAB PENETRATION
4 EXISTING CONCRETE PAD.
5 FIRE DAMPER AT FLOOR PENETRATION

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STEVEN M. MARTEL
2-17-22
7148
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PROFESSIONAL ENGINEER

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C	ADDENDUM NO.3	02-17-2022
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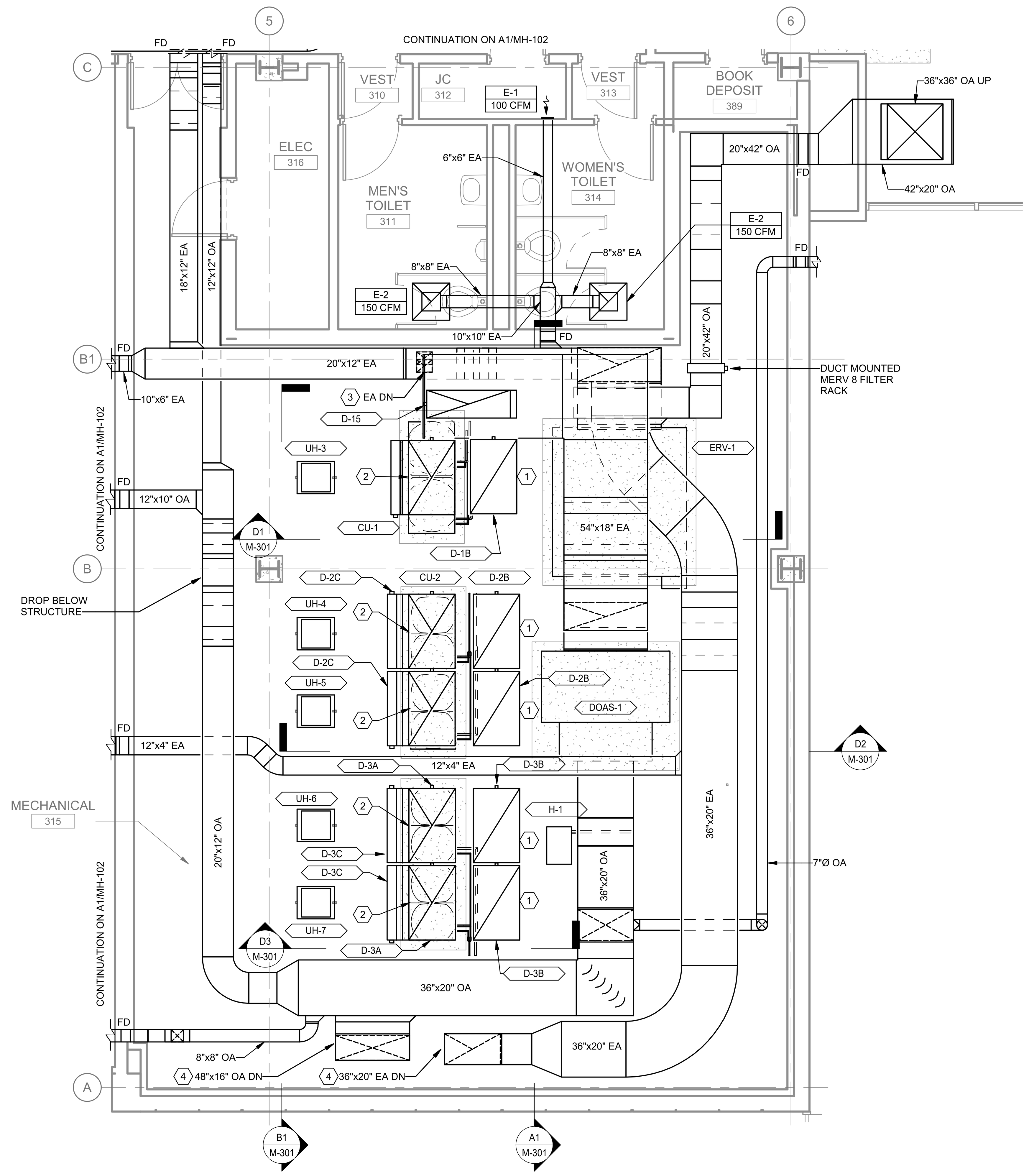
PROJECT NO:	361820720
PROJECT MANAGER:	KFM
A/E OF RECORD:	SMM
DESIGNED BY:	SMM
DRAWN BY:	BAL

SHEET TITLE:
MECHANICAL PART PLANS

SHEET ID:
M-403

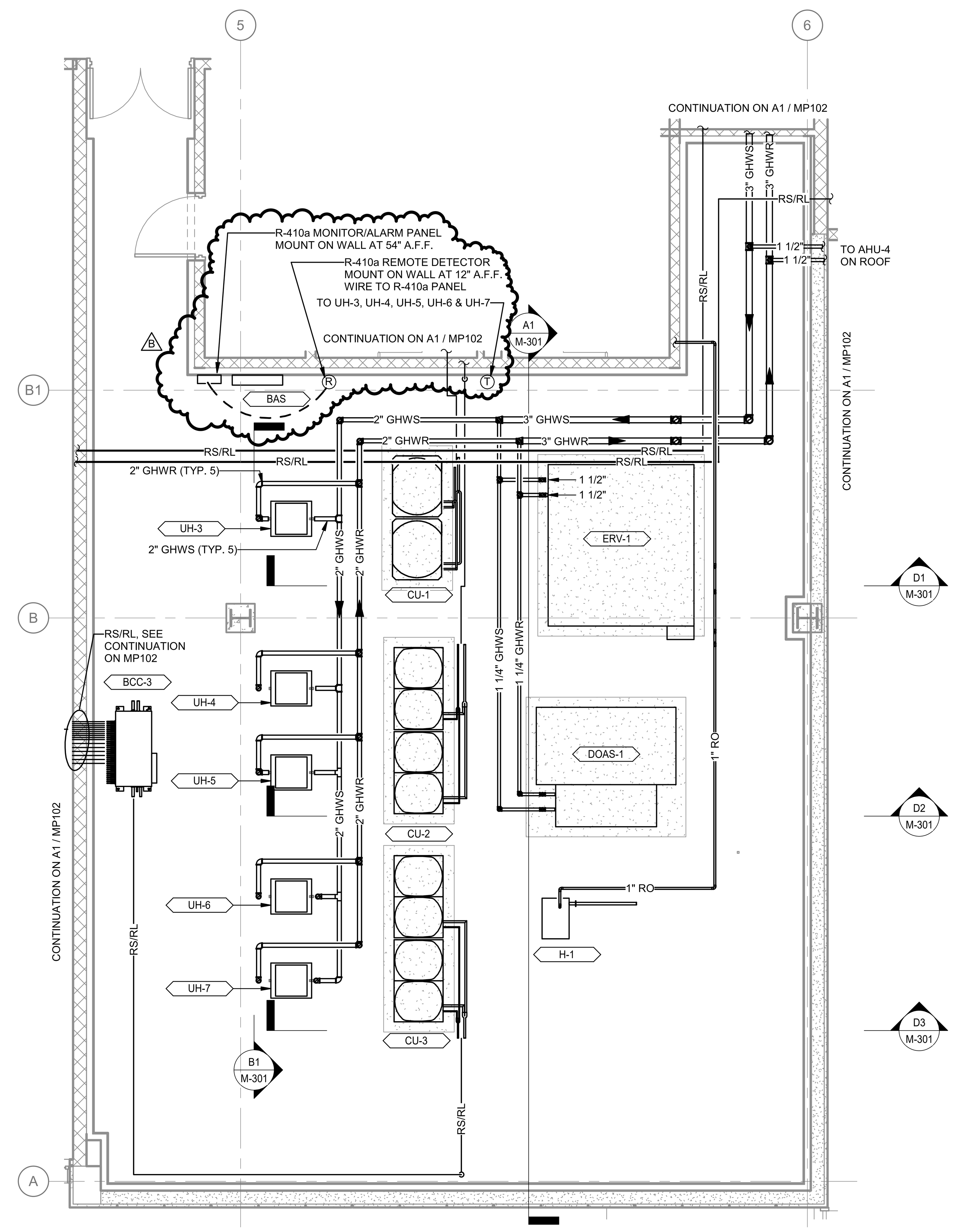
NOT FOR CONSTRUCTION

BIM 360://361820720 - ME Cultural Building Mechanical Upgrades/361820720_MP_R20.rvt



A1 LIBRARY - THIRD LEVEL MECHANICAL 315 DUCTWORK PART PLAN

1/4" = 1'-0"



A4 LIBRARY - THIRD LEVEL MECHANICAL 315 PIPING PART PLAN

1/4" = 1'-0"

NOTES

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KEYED NOTES

1 48"x30" OA UP
2 48"x30" EA UP
3 FIRE DAMPER AT SLAB PENETRATION
4 FIRE DAMPER AT FLOOR PENETRATION

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STATE OF MAINE · STEVEN M. MARTEL · 2/17/2022 · 7148 · LICENSED · PROFESSIONAL ENGINEER

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SHEET TITLE:
MECHANICAL PART PLANS

SHEET ID:
M-404

NOT FOR CONSTRUCTION

RETURN, TRANSFER & EXHAUST GRILLE SCHEDULE

TAG	TYPE	NOMINAL INCHES WIDTH X HEIGHT	FACE INCHES WIDTH X HEIGHT	MAX AIRFLOW (CFM)	MAX VELOCITY (FPM)	MAX SP IN WG	MAX NC	BLADE ANGLE	BLADE SPACING (INCH)	FRONT BLADE ORIENTATION	MATERIAL	FRAME	FILTER FRAME	BASIS OF DESIGN MFG	BASIS OF DESIGN MODEL	NOTES
R-1	LOUVERED	6 x 6	8 x 8	90	500	0.07	19	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1, 2
R-2	LOUVERED	8 x 8	10 x 10	160	400	0.04	15	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1, 2
R-3	LOUVERED	10 x 10	12 x 12	240	400	0.04	16	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
R-4	LOUVERED	12 x 12	14 x 14	360	400	0.04	18	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
R-5	LOUVERED	16 x 16	18 x 18	640	400	0.04	19	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
R-6	LOUVERED	22 x 14	24 x 16	980	400	0.04	20	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
R-7	LOUVERED	22 x 22	24 x 24	1,100	300	0.03	15	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	FILTER FRAME	PRICE	630	1,2,3
R-8	LOUVERED	22 x 22	24 x 24	1,420	400	0.04	22	45	0.75	HORIZONTAL	ALUMINUM	LAY-IN	FILTER FRAME	PRICE	630	1,2,3
R-9	LOUVERED	24 x 36	26 x 38	1,700	300	0.03	15	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
R-10	LOUVERED	22 x 12	24 x 14	700	400	0.04	15	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
R-11	LOUVERED	18 x 30	20 x 32	1,100	300	0.03	15	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
R-12	LOUVERED	22 x 34	24 x 36	1,400	300	0.03	15	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
R-13	LOUVERED	30 x 30	32 x 32	1,800	300	0.03	15	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
R-16	LOUVERED	7 x 4	9 x 6	105	700	0.14	28	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
R-17	LOUVERED	14 x 5	16 x 7	234	600	0.10	26	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
R-18	LOUVERED	20 x 5	22 x 7	420	700	0.14	32	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
R-19	LOUVERED	18 x 8	20 x 10	455	500	0.07	24	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
E-1	LOUVERED	6 x 6	8 x 8	90	500	0.07	19	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
E-2	LOUVERED	8 x 8	10 x 10	160	400	0.04	15	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
E-3	LOUVERED	10 x 10	12 x 12	240	400	0.04	16	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
E-4	LOUVERED	12 x 12	14 x 14	360	400	0.04	18	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
E-5	LOUVERED	14 x 14	16 x 16	470	400	0.04	18	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
E-6	LOUVERED	16 x 16	18 x 18	640	400	0.04	19	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
E-7	LOUVERED	22 x 14	24 x 16	980	400	0.04	20	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
E-8	LOUVERED	22 x 22	24 x 24	1,400	400	0.04	29	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
T-1	LOUVERED	6 x 6	8 x 8	90	500	0.07	19	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
T-2	LOUVERED	8 x 8	10 x 10	160	400	0.04	15	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
T-3	LOUVERED	10 x 10	12 x 12	240	400	0.04	16	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
T-4	LOUVERED	12 x 12	14 x 14	360	400	0.04	18	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
T-5	LOUVERED	22 x 8	24 x10	430	400	0.04	18	45	0.75	HORIZONTAL	ALUMINUM	FLUSH	NONE	PRICE	630	1,2,3
T-6	LOUVERED	22 x 22	24 x 24	1,420	400	0.04	22	45	0.75	HORIZONTAL	ALUMINUM	LAY-IN	NONE	PRICE	630	1,2,3

NOTES:
1. PROVIDE WHITE BAKED ENAMEL FINISH.
2. PROVIDE WITH OPPOSED BLADE VOLUME DAMPER.

DESIGN CONDITIONS

LOCATION	CONDITION	ASHRAE DESIGN	TEMPERATURE DB (°F)	TEMPERATURE WB (°F)	PSYCHROMETRICS RELATIVE HUMIDITY (%)	PSYCHROMETRICS DEWPOINT (°F)	NOTES
OUTDOORS	COOLING	0.4%	87.1	70.6	45%	63.0	1,2
	DEHUMIDIFICATION	0.4%	77.2	72.3	79%	70.4	1,2
	HEATING	99.6%	-2.9	-4.4	46%	-17.1	1,2
INDOORS	COOLING	-	74.0	61.7	50%	54.2	2
	HEATING	-	70.0	55.7	40%	44.6	2
	ARCHIVES STORAGE	-	65.0	53.1	45%	43.2	2
	COLD STORAGE	-	50.0	37.4	25%	17.4	2
	MECH/ELEC ROOMS	-	65.0	-	-	-	2, 3
	CU MECH ROOMS	-	40.0	-	-	-	2, 3

NOTES:
1. OUTDOOR DESIGN CONDITIONS FROM ASHRAE WEATHER DATA 2017 FOR AUGUSTA, ME
2. ELEVATION = 361 FEET.
3. AREA IS HEATING ONLY.

AIR HANDLING UNIT SOUND RATING SCHEDULE

TAG	SERVES	SOUND PATH	63 HZ DB	125 HZ DB	250 HZ DB	500 HZ DB	1K HZ DB	2K HZ DB	4K HZ DB	8K HZ DB	NOTES
		ACOUSTICAL RATING (MAXIMUM)									
AHU-1	EXHIBIT LEVELS 1& 2	SUPPLY TOP	80	84	88	79	75	71	67	60	1
		RETURN	77	78	92	72	66	68	63	53	
		OUTDOOR	78	79	88	76	72	69	64	56	
		EXHAUST	78	79	88	76	70	67	62	53	
		CASING	81	82	94	82	75	65	64	57	
AHU-2	EXHIBIT LEVEL 3	SUPPLY TOP	81	80	75	79	75	72	66	58	1
		RETURN	74	74	77	75	68	72	68	55	
		OUTDOOR	75	75	72	77	72	71	68	56	
		EXHAUST	74	74	71	78	71	70	67	53	
		CASING	82	75	76	80	71	61	57	50	
AHU-3	EXHIBIT LEVEL 4	SUPPLY TOP	80	78	75	87	75	71	68	62	1
		RETURN	70	69	62	65	53	53	50	42	
		OUTDOOR	68	65	62	63	51	50	45	37	
		CASING	85	74	75	92	75	64	61	54	
AHU-4	ATRIUM	RADIATED	60	70	77	82	82	82	83	79	2

NOTES:
1. SUPPLY FAN SOUND DATA.
2. SOUND LEVELS ARE APPROXIMATE.

SUPPLY AIR DIFFUSER SCHEDULE

TAG	TYPE	NECK INCH W	NECK INCH H	FACE INCH W	FACE INCH H	CORE AREA (SF)	MAX AIRFLOW (CFM)	CORE VELOCITY (FPM)	MAX SP (IN WG)	MAX NC	THROW FT (1)	BLOW DIRECTION	FRAME MATERIAL	FRAME TYPE	BLADE MATERIAL	FRONT BLADE ORIENTATION	BASIS OF DESIGN PRICE MODEL	ACCESSORIES NOTES
S-1	DIRECTIONAL	6	6	24.00	24.00	0.25	125	500	0.10	17	10	4 WAY	ALUMINUM	LAY-IN	ALUMINUM	HORIZONTAL	AMDE	1, 2
S-2	DIRECTIONAL	6	6	24.00	24.00	0.25	125	500	0.10	17	10	3 WAY	ALUMINUM	LAY-IN	ALUMINUM	HORIZONTAL	AMDE	1, 2
S-3	DIRECTIONAL	6	6	24.00	24.00	0.25	125	500	0.10	17	14	2 WAY-180°F	ALUMINUM	LAY-IN	ALUMINUM	HORIZONTAL	AMDE	1, 2
S-4	DIRECTIONAL	6	6	24.00	24.00	0.25	125	500	0.10	17	14	2 WAY-90°F	ALUMINUM	LAY-IN	ALUMINUM	HORIZONTAL	AMDE	1, 2
S-5	DIRECTIONAL	9	9	24.00	24.00	0.56	280	500	0.10	21	15	4 WAY	ALUMINUM	LAY-IN	ALUMINUM	HORIZONTAL	AMDE	1, 2
S-6	DIRECTIONAL	9	9	24.00	24.00	0.56	280	500	0.10	21	15	3 WAY	ALUMINUM	LAY-IN	ALUMINUM	HORIZONTAL	AMDE	1, 2
S-7	DIRECTIONAL	9	9	24.00	24.00	0.56	280	500	0.10	21	18	2 WAY-180°F	ALUMINUM	LAY-IN	ALUMINUM	HORIZONTAL	AMDE	1, 2
S-8	DIRECTIONAL	9	9	24.00	24.00	0.56	280	500	0.10	21	18	2 WAY-90°F	ALUMINUM	LAY-IN	ALUMINUM	HORIZONTAL	AMDE	1, 2
S-9	DIRECTIONAL	12	12	24.00	24.00	1.00	500	500	0.10	24	17	4 WAY	ALUMINUM	LAY-IN	ALUMINUM	HORIZONTAL	AMDE	1, 2
S-10	DIRECTIONAL	12	12	24.00	24.00	1.00	500	500	0.10	24	17	3 WAY	ALUMINUM	LAY-IN	ALUMINUM	HORIZONTAL	AMDE	NOT USED
S-11	DIRECTIONAL	12	12	24.00	24.00	1.00	500	500	0.10	24	21	2 WAY-180°	ALUMINUM	LAY-IN	ALUMINUM	HORIZONTAL	AMDE	NOT USED
S-12	DIRECTIONAL	12	12	24.00	24.00	1.00	500	500	0.10	24	21	2 WAY-90°	ALUMINUM	LAY-IN	ALUMINUM	HORIZONTAL	AMDE	1, 2
S-21	DOUBLE DEFLECTION	20	4	22.00	6.00	0.46	325	700	0.07	20	32	0°	ALUMINUM	FLUSH	ALUMINUM	HORIZONTAL	620	1, 2
S-22	DOUBLE DEFLECTION	7	4	9.00	6.00	0.15	105	700	0.03	15	13	0°	ALUMINUM	FLUSH	ALUMINUM	HORIZONTAL	620	1, 2
S-23	DOUBLE DEFLECTION	8	5	10.00	7.00	0.22	220	1,000	0.06	27	19	0°	ALUMINUM	FLUSH	ALUMINUM	HORIZONTAL	620	1, 2
S-24	DOUBLE DEFLECTION	18	5	20.00	7.00	0.52	415	800	0.04	24	26	0°	ALUMINUM	FLUSH	ALUMINUM	HORIZONTAL	620	1, 2
S-25	DOUBLE DEFLECTION	20	6	22.00	8.00	0.69	485	700	0.07	22	29	0°	ALUMINUM	FLUSH	ALUMINUM	HORIZONTAL	620	1, 2
S-26	LINEAR - 1 SLOT	-	-	48.00	3.00		24 CFM/FT		0.06	18	12	0°	ALUMINUM	FLUSH	ALUMINUM	HORIZONTAL	SDS75	1, 2
S-27	LINEAR - 2 SLOT	-	-	48.00	4.50		48 CFM/FT		0.06	23	17	0°	ALUMINUM	FLUSH	ALUMINUM	HORIZONTAL	SDS75	1, 2
S-28	LINEAR - 3 SLOT	-	-	48.00	6.00		72 CFM/FT		0.06	25	21	0°	ALUMINUM	FLUSH	ALUMINUM	HORIZONTAL	SDS75	1, 2
S-29	LINEAR BAR GRILLE	24	2	26.00	4.00	0.33	39 CFM/FT		0.05	20	6	0°	ALUMINUM	FLUSH	ALUMINUM	HORIZONTAL	LBPH 16A	1, 2, 4

NOTES:
1. THROW LISTED IS FOR TERMINAL VELOCITY OF 100 FPM AT BLOW DIRECTION LISTED.
2. PROVIDE WHITE BAKED ENAMEL FINISH.
3. PROVIDE WITH OPPOSED BLADE DAMPER.
4. REINFORCED FOR FLOOR SERVICE

ENERGY RECOVERY VENTILATOR

ERV	SERVES	LOCATION	SEASON	FANS QTY	FANS AIR PATH	FANS CFM	FANS BHP	FANS HP (WATTS)	FANS ESP (IN WC)	HOT WATER PREHEAT COIL FLUID	CAPACITY (MBH)	FLOW RATE (GPM)	EAT (°F)	LAT (°F)	EWT (°F)	LWT (°F)	WPD (FT HD)	HEAT EXCHANGER CORE EAT °F DB	EAT °F WB	LAT °F DB	LAT °F WB	TOTAL EFF %	SENS EFF %	UNIT POWER FLA	MCA	MOCP	VOLT	PHASE	HZ	MFG MODEL	WEIGHT LBS	NOTES
ERV-1	DOAS-1	LIBRARY	COOL	3	SUPPLY	7,550	6.0	10.2	0.5	-	-	-	-	-	-	-	-	92.5	76.5	78.4	68.4	53.6	68.9	21.6	22.6	23.6	480	3	60	AURAGREEN	2,116	1,2,3,4,5,7
				3	EXHAUST	6,795	7.5	10.2	2.0	-	-	-	-	-	-	-	-	72.0	60.1	86.3	69.7											
			HEAT	3	SUPPLY	7,550	6.0	10.2	0.5	30% GLYCOL	304.7	16.0	-10.0	27.3	170.0	130.0	2.5	27.3	20.0	56.7	44.1	60.9	68.9							M09i-FSE		
				3	EXHAUST	6,795	7.5	10.2	2.0	-	-	-	-	-	-	-	-	70.0	55.8	40.8	36.3											
ERV-2	DOAS-2	ARCHIVES	COOL	2	SUPPLY	3,450	2.6	6.7	0.5	-	-	-	-	-	-	-	-	92.5	76.5	78.4	68.5	53.2	68.7	14.4	18	20	480	3	60	AURAGREEN	1,023	1,2,3,4,5,7
				2	EXHAUST	3,105	3.4	6.7	2.0	-	-	-	-	-	-	-	-	72.0	60.1	86.2	69.6											
			HEAT	2	SUPPLY	3,450	2.6	6.7	0.5	30% GLYCOL	117.8	6.2	-10.0	21.5	170.0	130.0	2.5	21.5	16.0	54.8	43.2	61.3	68.7							M04i-FSE		
				2	EXHAUST	3,105	3.4	6.7	2.0	-	-	-	-	-	-	-	-	70.0	55.8	36.9	34.2											
ERV-3	DOAS-3	MUSEUM	COOL	2	SUPPLY	5,600	4.1	6.8	0.5	-	-	-	-	-	-	-	-	92.5	72.0	78.3	68.3	54.1	69.2	15.8	19.8	25	480	3	60	AURAGREEN	1,683	1,2,3,4,5,7
				2	EXHAUST	5,040	5.3	6.8	2.0	-	-	-	-	-	-	-	-	72.0	60.1	86.3	69.7											
			HEAT	2	SUPPLY	5,600	4.1	6.8	0.5	30% GLYCOL	217.2	11.4	-10.0	25.8	170.0	130.0	2.8	25.8	19.0	56.4	44.1	61.5	69.2							M07i-FSE		
				2	EXHAUST	5,040	5.3	6.8	2.0	-	-	-	-	-	-	-	-	70.0	55.8	39.6	35.6											
ERV-4	BASEMENT AREAS	MECHANICAL B-5	COOL	1	SUPPLY	800	--	1.0	1.0	-	-	-	-	-	-	-	-	92.5	72.0	79.5	66.7	58.6	74.6	--	9.9	15	208	1	60	RENEWAIRE	504	4,5,6
				1	EXHAUST	800	--	1.0	0.5	-	-	-	-	-	-	-	-	75.0	62.5	--	--											
			HEAT	1	SUPPLY	800	--	1.0	1.0	-	-	-	-	-	-	-	-	-3.0	-4.0	51.4	44.3	73.4	74.6							HE-1.5JINH		
				1	EXHAUST	800	--	1.0	0.5	-	-	-	-	-	-	-	-	70.0	55.8	--	--											

NOTES
1. UNIT SHALL HAVE 2 INCH MERV 8 FILTERS FOR SUPPLY & EXHAUST AIR.
2. DIRECT DRIVE PLENUM FANS WITH EC MOTOR.
3. UNIT SHALL HAVE ANTIMICROBIAL INSULATION.
4. UNIT SHALL HAVE BACNET CONTROL.
5. SINGLE POINT ELECTRICAL CONNECTION
6. UNIT SHALL HAVE 2 INCH MERV 8 FILTER FOR RETURN AIR AND 2" MERV 13 FOR OUTSIDE AIR.
7. DIRTY FILTER SENSOR

DEDICATED OUTSIDE AIR HANDLING UNIT SCHEDULE

TAG	SERVES	MOUNTING LOCATION	AIR FLOW OUTSIDE AIR CFM	OUTSIDE AIR % OF SA	STATIC PRESSURE EXTERNAL IN WC	STATIC PRESSURE TOTAL IN WC	FAN QUANTITY	DRIVE TYPE	DRIVE CONTROL	WHEEL DIAMETER INCH	WHEEL TYPE	WHEEL RPM	POWER BRAKE HP	POWER MOTOR HP
DOAS-1	LIBRARY WING	MECHANICAL ROOM 3RD FLOOR EAST	7,550	100%	2.00	3.36	2	DIRECT	ECM	17.72	BI	1,966	6.1	6.97
DOAS-2	ARCHIVES WING	MECHANICAL ROOM 3RD FLOOR WEST	3,450	100%	2.00	2.85	1	DIRECT	ECM	17.72	BI	1,800	2.4	6.97
DOAS-3	MUSEUM	MECHANICAL ROOM 4TH FLOOR 416	5,600	100%	1.00	2.50	1	DIRECT	ECM	17.72	BI	2,450	5.1	6.97

TAG	FILTERS TYPE	PERFORMANCE MERV	DEPTH INCH	FACE AREA FT^2	APD IN WC
DOAS-1	PREFILTER	8	2	-	0.20
	FINAL	14	4	-	
DOAS-2	PREFILTER	8	2	-	0.06
	FINAL	14	4	-	
DOAS-3	PREFILTER	8	2	-	0.16
	FINAL	14	4	-	

TAG	COILS SERVICE	AIR TEMPERATURE ENTERING DB °F	ENTERING WB °F	LEAVING DB °F	LEAVING WB °F	AIR PD IN WC	WATER FLUID	ENTERING °F	LEAVING °F	FLOW GPM	WPD FT	CONFIGURATION AREA FT2	ROWS	FIN SPACING FPI	GROSS CAPACITY TOTAL MBH	SENSIBLE MBH
DOAS-1	DX COOLING	78.4	68.4	51.1	51.0	0.79	DX	-	-	-	-	16.00	6	12	403	228
	SUBCOOLING	51.1	51.0	58.9	54.3	-	DX	-	-	-	-	-	-	-	-	-
	HOT GAS REHEAT (MAX)	58.9	54.3	76.3	61.0	-	DX	-	-	-	-	-	-	-	-	-
	HOT WATER HEAT	55.8	-	97.4	-	0.22	30% PG	170.0	120.0	13.8	1.7	16.00	2	10	341	341
DOAS-2	DX COOLING	78.4	68.5	52.7	52.5	0.45	DX	-	-	-	-	10.00	6	12	171	98
	SUBCOOLING	52.7	52.5	59.8	55.5	-	DX	-	-	-	-	-	-	-	-	-
	HOT GAS REHEAT (MAX)	59.8	55.5	74.1	60.9	-	DX	-	-	-	-	-	-	-	-	-
	HOT WATER HEAT	54.8	-	95.6	-	0.13	30% PG	170.0	120.0	6.6	0.4	10.00	2	10	153	153
DOAS-3	DX COOLING	78.3	68.3	50.2	49.9	0.78	DX	-	-	-	-	12.00	6	12	311	174
	SUBCOOLING	50.2	49.9	59.3	53.8	-	DX	-	-	-	-	-	-	-	-	-
	HOT GAS REHEAT (MAX)	59.3	53.8	75.8	60.3	-	DX	-	-	-	-	-	-	-	-	-
	HOT WATER HEAT	56.4	-	95.5	-	0.22	30% PG	170.0	120.0	10.0	1.0	12.00	2	10	237	237

TAG	EER	ELECTRICAL VOLTS	PHASE	HZ	FLA AMPS	MCA AMPS	MOCP AMPS	BASIS OF DESIGN MFG	MODEL	WEIGHT LBS	BASE RAIL HEIGHT INCH	NOTES
DOAS-1	13.0	480	3	60	13.2	14.8	20	ADDISON	MAOA 360	1,860	1.5	1,2,3,4
DOAS-2	13.7	480	3	60	6.6	8.2	15	ADDISON	MAOA 150	1,245	1.5	1,2,3,4
DOAS-3	12.1	480	3	60	6.6	8.2	15	ADDISON	MAOA 240	1,400	1.5	1,2,3,4

NOTES
1. PROVIDE WITH STAINLESS STEEL DRAIN PAN
2. FILTER PRESSURE DROPS ARE INITIAL.
3. FUSED DISCONNECT
4. SEE DOAS CU SCHEDULE FOR ASSOCIATED CONDENSING UNITS.
5. PROVIDE WITH CONDENSATE OVERFLOW SWITCH.
6. PROVIDE WITH CLOGGED FILTER INDICATOR.

NOTES

1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.

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STATE OF MAINE
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AUGUSTA, MAINE 04333-0077
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STATE OF MAINE STEVEN M. MARTEL 2/17/2022 7148 LICENSED PROFESSIONAL ENGINEER

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
B	ADDENDUM NO.3	02-17-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	SMM
DESIGNED BY:	SMM
DRAWN BY:	STR

SHEET TITLE:
MECHANICAL SCHEDULES

SHEET ID:
M-601

NOT FOR CONSTRUCTION

GRAVITY VENTILATOR SCHEDULE

TAG	SERVICE	AIRFLOW (CFM)	THROAT VELOCITY (FPM)	PRESSURE DROP (IN. WG)	DUCT CONNECTION SIZE (IN)	BASIS OF DESIGN MFG & MODEL	NOTES
GV-1	INTAKE; ERV-1	7550	839	0.1	36X36	GREENHECK FGI-36X36	1, 2

NOTES
1. PROVIDE WITH INTEGRAL BIRDSCREEN.
2. PROVIDE WITH MIN. 12" TALL MANUFACTURER FURNISHED ROOF CURB.
3. INSTALL CONTROL DAMPER, D-14, IN ROOF CURB.
4. 12" BASE.

GLYCOL MAKE-UP UNIT SCHEDULE

TAG	LOCATION	SERVES	TANK MATERIAL	TANK SIZE (GALLONS)	PUMP TYPE	FLUID	FLOW (GPM)	HEAD (PSIG)	PUMP			POWER			BASIS OF DESIGN			NOTES
									CONTROL	MHP	RPM	VOLTS	PHASE	HZ	MANUFACTURER	MODEL	WEIGHT (LB)	
GMU-1	MECHANICAL B-5	GLYCOL SYSTEM	HDPE	50	ROTARY VANE	30% PG	1.8	70	BMS	1/3	1,760	110	1	60	WESSELS	GMPD-23050	153	1, 2, 3, 4

NOTES:
1. PROVIDE TWIN PUMP UNIT WITH PRESSURE SWITCH AND ALTERNATING CONTROL
2. PROVIDE RELAY CONTACT FOR CONTROL THROUGH BMS SYSTEM
3. PROVIDE PRESSURE REDUCING VALVE SET TO MINIMUM SYSTEM PRESSURE
4. PROVIDE HOA CONTROL

FAN SCHEDULE

TAG	LOCATION	FAN TYPE	SYSTEM TYPE	DRIVE TYPE	AIRFLOW (CFM)	ESP (IN WG)	MOTOR SIZE (HP)	SPEED (RPM)	ELECTRICAL		MFR	MODEL NUMBER	WEIGHT (LBS)	NOTES
									V/Ph/Hz	FLA (A)				
SF-1	4TH FLOOR ROOF	FILTERED ROOF SUPPLY	SUPPLY	BELT	4,000	0.50	2	775	460/3/60	3.4	GREENHECK	SAF-115	260	1, 2

NOTES:
1. PROVIDE MANUFACTURER FURNISHED MIN 18 INCH HIGH ROOF CURB
2. NEMA 1 DISCONNECT SWITCH LOCATED WITHIN FAN HOUSING

VALVE SCHEDULE

TAG	SERVICE	TYPE	DOMESTIC CONNECTION SIZE (INCH)		MAX. FLOW RATE (GPM)	MAX. OPERATING PRESSURE (PSI)	TEMPERATURE (°F)		BASIS OF DESIGN		NOTES
			INLET	OUTLET			FROM WH	TO PLUMBING FIXTURES	MFG	MODEL	
MV-1	DOMESTIC WATER	THERMOSTATIC MIXING VALVE	1.5	1.5	24	125	140	105	WATTS	LFN SERIES	1, 2

NOTES:
1. LEAD FREE BRASS BODY CONSTRUCTION
2. RATED FOR POTABLE HOT WATER SERVICE

BRANCH CIRCUIT CONTROLLER SCHEDULE

TAG	SERVES	NUMBER OF PORTS	CONNECTED CAPACITY TO BC (MBH)	ELECTRICAL			BASIS OF DESIGN	NOTES
				VOLTS	PHASE	HZ	MITSUBISHI MODEL	
BCC-1	CU-1	12	153	208	1	60	TCMBM1012JA11N4	1, 2
BCC-2	CU-2	16	311	208	1	60	TCMBM1016JA11N4	1, 2
BCC-3	CU-3	16	195	208	1	60	TCMBM1016JA11N4	1, 2
BCC-5	CU-5	16	175	208	1	60	TCMBM1016JA11N4	1, 2
BCC-6	CU-6	8	74	208	1	60	TCMBM0108JA11N4	1, 2
BCC-7	CU-7	16	191	208	1	60	TCMBM1016KA11N4	1, 2
BCC-7-1	CU-7	8	84	208	1	60	TCMBS0108KB11N4	1, 2

NOTES:
1. PROVIDE WITH DIAMONDBACK BALL VALVES BV-SERIES, 700 PSIG WORKING PRESSURE, FULL PORT, 410A RATED.
2. COORDINATE WITH MANUFACTURER FOR MAXIMUM ALLOWABLE INDOOR UNIT CAPACITY FOR SUB BC CONTROLLER.

LOUVER SCHEDULE

TAG	LOCATION	SERVES	AIRFLOW		DEPTH (INCH)	WIDTH (INCH)	HEIGHT (INCH)	FACE AREA		FREE AREA		BLADE		APD (IN WC)	BASIS OF DESIGN		NOTES
			DIRECTION	CFM				SQ FT	FPM	SQ FT	FPM	TYPE	ANGLE		MFG	MODEL	
L-1A	ARCHIVES MECH RM	CU-4	EXHAUST	9,200	6	108	48	36.00	256	21.72	424	DRAINABLE	35	0.02	GREENHECK	ESD-635	1. 2
L-1B	ARCHIVES MECH RM	CU-4	INTAKE	9,200	6	108	48	36.00	256	21.72	424	DRAINABLE	35	0.02	GREENHECK	ESD-635	1, 2
L-2A	ARCHIVES MECH RM	CU-5	EXHAUST	14,850	6	108	48	36.00	413	21.72	684	DRAINABLE	35	0.06	GREENHECK	ESD-635	1, 2
L-2B	ARCHIVES MECH RM	CU-5	INTAKE	14,850	6	108	48	36.00	413	21.72	684	DRAINABLE	35	0.06	GREENHECK	ESD-635	1, 2
L-3A	ARCHIVES MECH RM	ERV-2	EXHAUST	3,105	6	108	48	36.00	86	21.72	143	DRAINABLE	35	0.00	GREENHECK	ESD-635	1, 2
L-3B	ARCHIVES MECH RM	ERV-2	INTAKE	3,450	6	108	48	36.00	96	21.72	159	DRAINABLE	35	0.00	GREENHECK	ESD-635	1, 2
L-4A	LIBRARY MECH RM	CU-1 &...	EXHAUST	14,150	6	108	48	36.00	393	21.72	651	DRAINABLE	35	0.06	GREENHECK	ESD-635	1, 2
L-4B	LIBRARY MECH RM	CU-1 &...	INTAKE	14,150	6	108	48	36.00	393	21.72	651	DRAINABLE	35	0.06	GREENHECK	ESD-635	1, 2
L-5A	LIBRARY MECH RM	CU-2	EXHAUST	14,150	6	108	48	36.00	393	21.72	651	DRAINABLE	35	0.06	GREENHECK	ESD-635	1, 2
L-5B	LIBRARY MECH RM	CU-2	INTAKE	14,150	6	108	48	36.00	393	21.72	651	DRAINABLE	35	0.06	GREENHECK	ESD-635	1, 2
L-6A	LIBRARY MECH RM	CU-3	EXHAUST	14,800	6	108	48	36.00	411	21.72	681	DRAINABLE	35	0.06	GREENHECK	ESD-635	1, 2
L-6B	LIBRARY MECH RM	CU-3	INTAKE	14,800	6	108	48	36.00	411	21.72	681	DRAINABLE	35	0.06	GREENHECK	ESD-635	1, 2
L-7	MUSEUM MECH RM	CU-7	EXHAUST	14,850	6	82	76	43.28	343	38.76	383	DRAINABLE	35	0.02	GREENHECK	ESD-635	1, 2
L-8	MUSEUM MECH RM	CU-6	EXHAUST	6,000	6	82	76	43.28	139	21.56	278	DRAINABLE	35	0.01	GREENHECK	ESD-635	1, 2
L-9	MUSEUM MECH RM	CU-7	INTAKE	14,850	6	82	76	43.28	343	38.76	383	DRAINABLE	35	0.02	GREENHECK	ESD-635	1, 2
L-10	MUSEUM MECH RM	CU-6	INTAKE	6,000	6	82	76	43.28	139	21.56	278	DRAINABLE	35	0.01	GREENHECK	ESD-635	1, 2
L-11	MUSEUM MECH RM	ERV-3	INTAKE	5,600	6	82	76	43.28	129	38.76	144	DRAINABLE	35	0.02	GREENHECK	ESD-635	1, 2
L-12	MUSEUM MECH RM	--	--	--	--	82	76	43.28	--	--	--	DRAINABLE	35	--	GREENHECK	ESD-635	1, 2, 3
L-13	LIBRARY MECH RM	ERV-1	EXHAUST	6,795	6	120	48	40.00	170	23.75	286	DRAINABLE	35	0.02	GREENHECK	ESD-635	1, 2

NOTES:
1. FABRICATE LOUVER OF EXTRUDED ALUMINUM BLADES AND FRAME WITH KYNAR FINISH.
2. PROVIDE LOUVER WITH 1/2 INCH MESH STAINLESS STEEL BIRD SCREEN.
3. BLANK OFF AND INSULATE LOUVER FROM THE INSIDE.

C

AIR SEPARATOR SCHEDULE

TAG	SERVICE	TYPE	CASING MATERIAL	CONNECTION SIZE (INCH)	FLUID	FLOW RATE (GPM)	PRESSURE DROP (FT WC)	BASIS OF DESIGN			NOTES
								MFG & MODEL	DRY WEIGHT (LBS)	FLOODED WEIGHT (LBS)	
AS-1	GLYCOL LOOP	AIR & DIRT SEPARATOR	CARBON STEEL	4.00	30% PG	235	1.31	TACO 4904ADH-125	130	190	1 - 5
AS-2	HOT WATER LOOP	AIR & DIRT SEPARATOR	CARBON STEEL	2.50	WATER	65	1.54	TACO 4902ADH-125	105	146	1 - 5

NOTES
1. PROVIDE WITH INTEGRAL STRAINER.
2. PROVIDE WITH FLANGED PIPE CONNECTIONS.
3. DESIGNED AND CONSTRUCTED PER ASME.
4. PROVIDE WITH HIGH CAPACITY AUTOMATIC AIR VENT.
5. PROVIDE FACTORY INSTALLED BLOW DOWN VALVE.

FAN COIL UNIT SCHEDULE

TAG	COND. UNIT	LOCATION	UNIT				AIR FLOW				FAN		AIR					ELECTRICAL					BASIS OF DESIGN		NOTES
			TYPE	INLET	DISCH.	FILTERS	SUPPLY AIR (CFM)	OUTSIDE AIR CFM	OUTSIDE AIR % OF SA	ESP (IN WC)	DRIVE TYPE	DRIVE CONTROL	MODE	ENTERING DB/WB (°F)	LEAVING DB/WB (°F)	TMBH	SMBH	VOLTS	PHASE	HZ	MCA	MOCP	MITSUBISHI MODEL	WEIGHT (LBS)	
FCU-01-01	CU-1	OPEN STACKS 101	CEILING CONCEALED	HORI	HORI	--	1342	645	48%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	55/52.7	40.4	30.2	208	1	60	4.2	15	TPEFYP048MH142A	86	1 - 4
													HEATING	66.0	95.0	35.5	-								
FCU-01-02	CU-1	LIBRARY CLOSED STACKS 109	CEILING CONCEALED	HORI	HORI	--	777	610	39%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	54.4/52.4	23.7	17.5	208	1	60	2.4	15	TPEFYP027MH142A	124	1 - 4
													HEATING	66.0	92.9	22.0	-								
FCU-01-03	CU-1	MAIL 108	CEILING CONCEALED	HORI	HORI	MERV13	600	118	10%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	55/45.4	15.8	12.9	208	1	60	1.6	15	TPEFYP018MA143A	58	1 - 4
													HEATING	66.0	95.0	14.7	-								
FCU-01-04	CU-1	PRELIMILARY PROCESS 111	CEILING CONCEALED	HORI	HORI	MERV13	494	127	13%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	55/52	13.2	10.7	208	1	60	1.5	15	TPEFYP015MA143A	58	1 - 4
													HEATING	66.0	95.0	12.5	-								
FCU-01-05	CU-1	CORRIDOR 119	CEILING CONCEALED	HORI	HORI	MERV13	300	24	4%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	55/54	5.3	5.3	208	1	60	1.1	15	TPEFYP006MA143A	49	1 - 4
													HEATING	66.0	95.0	4.9	-								
FCU-01-06	CU-1	WORKSHOP 121	CEILING CONCEALED	HORI	HORI	MERV13	300	351	59%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	51.7/50.1	5.3	5.3	208	1	60	1.1	15	TPEFYP006MA143A	49	1 - 4
													HEATING	66.0	68.3	4.9	-								
FCU-01-07	CU-1	WORKSHOP 122	CEILING CONCEALED	HORI	HORI	MERV13	300	140	23%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	58/52.7	5.3	5.3	208	1	60	1.1	15	TPEFYP006MA143A	49	1 - 4
													HEATING	66.0	70.0	4.9	-								
FCU-01-08	CU-1	OPEN STACKS 101	CEILING CONCEALED	HORI	HORI	--	883	349	20%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	55/51.9	23.7	19.2	208	1	60	2.9	15	TPEFYP027MA144A	67	1 - 4
													HEATING	66.0	95.0	22.0	-								
FCU-02-01	CU-2	OPEN LIBRARY STACKS 217	CEILING CONCEALED	HORI	HORI	--	1,306	525	20%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	51.5/49.5	38.5	30.1	208	1	60	4.4	15	TPEFYP048MA144A	86	1 - 4
													HEATING	66.0	88.5	38.3	-								
FCU-02-02	CU-2	FL2, LIBRARY	CEILING CONCEALED	HORI	HORI	--	1,306	525	20%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	51.5/49.5	38.5	30.1	208	1	60	4.4	15	TPEFYP048MA144A	86	1 - 4
													HEATING	66.0	88.5	38.3	-								
FCU-02-03	CU-2	OPEN LIBRARY STACKS 217	CEILING CONCEALED	HORI	HORI	--	300	118	20%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	50/49	6.4	5.7	208	1	60	1.1	15	TPEFYP008MA143A	49	1 - 4
													HEATING	66.0	83.6	6.4	-								
FCU-02-05	CU-2	OPEN LIBRARY STACKS 217	CEILING CONCEALED	HORI	HORI	--	300	118	20%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	50/49	6.4	5.7	208	1	60	1.1	15	TPEFYP008MA143A	49	1 - 4
													HEATING	66.0	83.6	6.4	-								
FCU-02-06	CU-2	OPEN LIBRARY STACKS 217	CEILING CONCEALED	HORI	HORI	--	300	119	20%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	50/49	6.4	5.7	208	1	60	1.1	15	TPEFYP008MA143A	49	1 - 4
													HEATING	66.0	83.5	6.4	-								
FCU-02-07	CU-2	OPEN LIBRARY STACKS 217	CEILING CONCEALED	HORI	HORI	--	371	168	23%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	50/49	9.7	7.5	208	1	60	1.2	15	TPEFYP012MA143A	49	1 - 4
													HEATING	66.0	82.2	9.6	-								
FCU-02-08	CU-2	LIBRARY WEST	CEILING CONCEALED	HORI	HORI	--	1,271	606	24%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	50/49	28.8	25.3	208	1	60	4.3	15	TPEFYP036MA144A	84	1 - 4
													HEATING	66.0	78.9	28.4	-								
FCU-02-09	CU-2	OPEN STAIR	CEILING CONCEALED	HORI	HORI	--	300	136	23%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	55/51	6.4	5.7	208	1	60	1.1	15	TPEFYP008MA143A	49	1 - 4
													HEATING	68.0	89.4	6.4	-								
FCU-02-10	CU-2	CIRC OFFICE	CEILING CONCEALED	HORI	HORI	--	600	84	7%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.1	15.3	12.8	208	1	60	1.6	15	TPEFYP018MA143A	58	1 - 4
													HEATING	68.0	88.9	14.2	-								
FCU-02-11	CU-2	REF OFFICE	CEILING CONCEALED	HORI	HORI	--	600	68	6%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/52.7	15.3	12.8	208	1	60	2.9	15	TPEFYP018MA144A	58	1 - 4
													HEATING	68.0	90.4	14.2	-								
FCU-02-12	CU-2	CONFERENCE ROOM 211	CEILING CONCEALED	HORI	HORI	MERV13	371	75	10%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	54.8/52.3	10.2	7.8	208	1	60	1.2	15	TPEFYP012MA143A	49	1 - 4
													HEATING	68.0	84.3	9.6	-								
FCU-02-13	CU-2	LIBRARIAN	CEILING CONCEALED	HORI	HORI	MERV13	494	51	5%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/52.9	12.7	10.6	208	1	60	2.9	15	TPEFYP015MA144A	58	1 - 4
													HEATING	68.0	95.0	12.1	-								
FCU-02-14	CU-2	CONFERENCE ROOM 224	CEILING CONCEALED	HORI	HORI	--	1,412	265	9%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/52.9	40.7	33.2	208	1	60	3.5	15	TPEFYP048MA143A	86	1 - 4
													HEATING	68.0	80.1	38.4	-								
FCU-02-15	CU-2	OFFICE 227 (GENEOLOGY OFFICE)	CEILING CONCEALED	HORI	HORI	--	300	43	7%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/51.6	5.1	5.1	208	1	60	1.1	15	TPEFYP006MA143A	49	1 - 4
													HEATING	68.0	73.1	4.8	-								
FCU-02-16	CU-2	OFFICE 227 (DOCUMENTS)	CEILING CONCEALED	HORI	HORI	--	600	329	27%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	55/51.3	14.5	12.3	208	1	60	1.6	15	TPEFYP018MA143A	58	1 - 4
													HEATING	66.0	88.5	14.3	-								
FCU-03-01	CU-3	OFFICE 302	CEILING CONCEALED	HORI	HORI	--	600	84	7%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.5	15.8	13.0	208	1	60	2.9	15	TPEFYP018MA144A	58	1 - 4
													HEATING	68.0	95.0	16.0	-								
FCU-03-02	CU-3	OFFICE 302A	CEILING CONCEALED	HORI	HORI	--	494	58	6%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.3	13.2	10.8	208	1	60	2.9	15	TPEFYP015MA144A	58	1 - 4
													HEATING	68.0	94.3	13.6	-								
FCU-03-03	CU-3	STORAGE 303	CEILING CONCEALED	HORI	HORI	--	300	93	16%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.8	7.0	6.1	208	1	60	1.8	15	TPEFYP008MA144A	47	1 - 4
													HEATING	68.0	95.0	7.0	-								
FCU-03-04	CU-3	PROCESSING EXT	CEILING CONCEALED	HORI	HORI	--	494	66	7%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.7	13.2	10.8	208	1	60	2.9	15	TPEFYP015MA144A	58	1 - 4
													HEATING	68.0	95.0	13.6	-								
FCU-03-05	CU-3	PROCESSING 309	CEILING CONCEALED	HORI	HORI	--	600	190	16%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.5	15.8	13.0	208	1	60	1.6	15	TPEFYP018MA143A	58	1 - 4
													HEATING	68.0	77.7	16.0	-								
FCU-03-06	CU-3	CONFERENCE 305	CEILING CONCEALED	HORI	HORI	--	371	150	20%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	50/48.6	10.5	7.9	208	1	60	1.2	15	TPEFYP012MA143A	49	1 - 4
													HEATING	68.0	78.2	10.8	-								
FCU-03-07	CU-3	CORRIDOR	CEILING CONCEALED	HORI	HORI	--	300	70	12%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/54.2	5.3	5.3	208	1	60	1.1	15	TPEFYP006MA143A	49	1 - 4
													HEATING	68.0	85.9	5.4	-								
FCU-03-08	CU-3	MAKER SPACE 318	CEILING CONCEALED	HORI	HORI	--	494	63	6%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.2	13.2	10.8	208	1	60	2.9	15	TPEFYP015MA144A	58	1 - 4
													HEATING	68.0	95.0	13.6	-								
FCU-03-09	CU-3	MIMEO	CEILING CONCEALED	HORI	HORI	MERV13	600	70	6%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.4	15.8	13.0	208	1	60	2.9	15	TPEFYP018MA144A	58	1 - 4
													HEATING	68.0	88.3	16.0	-								
FCU-03-10	CU-3	OFFICE - STORAGE	CEILING CONCEALED	HORI	HORI	--	371	80	11%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.6	10.5	7.9	208	1	60	2.1	15	TPEFYP012MA144A	47	1 - 4
													HEATING	68.0	93.2	10.8	-								
FCU-03-11	CU-3	LIBRARY LOBBY 325	CEILING CONCEALED	HORI	HORI	--	494	138	14%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	53.8/52.1	13.2	10.8	208	1	60	2.9	15	TPEFYP015MA144A	58	1 - 4
													HEATING	68.0	78.9	13.6	-								
FCU-03-12	CU-3	MUSEUM RESTROOMS 367/369	CEILING CONCEALED	HORI	HORI	--	300	0	0%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	54.8/52.4	7.0	6.1	208	1	60	1.1	15	TPEFYP008MA143A	49	1 - 4
													HEATING	68.0	87.9	7.0	-								
FCU-03-13	CU-3	MUSEUM LOBBY 373	CEILING CONCEALED	HORI	HORI	--	494	250	25%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	51.5/50.9	13.2	10.8	208	1	60	2.9	15	TPEFYP015MA144A	58	1 - 4
													HEATING	68.0	79.9	13.6	-								
FCU-03-14	CU-3	GIFT SHOP 374	CEILING CONCEALED	HORI	HORI	--	371	308	42%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	52.4/52.3	10.5	7.9	208	1	60	2.1	15	TPEFYP012MA144A	47	1 - 4
													HEATING	68.0	85.4	10.8	-								
FCU-03-15	CU-3	MAIN LOBBY 327	CEILING CONCEALED	HORI	HORI	--	300	123	21%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.4	7.0	6.1	208	1	60	1.1	15	TPEFYP008MA143A	49	1 - 4
													HEATING	68.0	79.6	7.0	-								
FCU-04-04	CU-4	STACKS 112 SOUTH	CEILING CONCEALED	HORI	HORI	MERV13	883	577	33%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	50.3/49.5	20.5	17.7	208	1	60	2.7	15	TPEFYP024MA143A	67	1 - 4
													HEATING	66.0	0.0	19.4	-								
FCU-04-05	CU-4	STACKS 112 NORTH	CEILING CONCEALED	HORI	HORI	MERV13	883	652	37%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	50/48.8	25.7	20.6	208	1	60	2.9	15	TPEFYP030MA144A	67	1 - 4
													HEATING	66.0	0.0	24.4	-								

NOTES:
1. REFRIGERANT SHALL BE R-410A.
2. SEE MECHANICAL FLOOR PLANS FOR LOCATIONS
3. TAG NUMBERS INCLUDE ASSOCIATED CONDENSING UNIT: FCU - CONDENSING UNIT NUMBER - FAN COIL UNIT NUMBER
4. PROVIDE INTEGRAL CONDENSATE PUMP

NOTES

1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.

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STATE OF MAINE
STEVEN M. MARTEL
2/17/2022
7148
LICENSED
PROFESSIONAL ENGINEER

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
C	ADDENDUM NO.3	02-17-2022
B	ADDENDUM NO. 2	02-08-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	SMM
DESIGNED BY:	SMM
DRAWN BY:	STR

SHEET TITLE:
MECHANICAL SCHEDULES

SHEET ID:
M-602

NOT FOR CONSTRUCTION

FAN COIL UNIT SCHEDULE

TAG	COND. UNIT	LOCATION	UNIT: TYPE	UNIT: INLET	UNIT: DISCH.	UNIT: FILTERS	AIR FLOW: SUPPLY AIR (CFM)	AIR FLOW: OUTSIDE AIR CFM	AIR FLOW: OUTSIDE AIR % OF SA	AIR FLOW: ESP (IN WC)	FAN DRIVE: TYPE	FAN DRIVE: CONTROL	AIR: MODE	AIR: ENTERING DB/WB (°F)	AIR: LEAVING DB/WB (°F)	AIR: TMBH	AIR: SMBH	ELECTRICAL: VOLTS	ELECTRICAL: PHASE	ELECTRICAL: HZ	ELECTRICAL: MCA	ELECTRICAL: MOCP	BASIS OF DESIGN: MITSUBISHI MODEL	BASIS OF DESIGN: WEIGHT (LBS)	NOTES
FCU-04-06	CU-4	COURT FILES ARCHIVAL 218 SOUTH	CEILING CONCEALED	HORI	HORI	MERV13	1,165	582	25%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	50.2/48.3	30.8	25.8	208	1	60	3.5	15	TPEFYP036MA143A	86	1 - 4
													HEATING	66.0	67.3	28.7	-								
FCU-04-07	CU-4	COURT FILES ARCHIVAL 218 NORTH	CEILING CONCEALED	HORI	HORI	MERV13	1,165	449	19%	0.6	DIRECT	VARIABLE SPEED	COOLING	70/58	50/48.3	30.8	25.8	208	1	60	3.5	15	TPEFYP036MA143A	86	1 - 4
													HEATING	66.0	0.0	28.7	-								
FCU-04-08	CU-4	ELECTRICAL SERVICE ENTRANCE	WALL MOUNTED	HORI	HORI	WASHABLE	297	0	0%	N/A	DIRECT	VARIABLE SPEED	COOLING	70/58	55/46.9	10.3	7.6	208	1	60	0.2	15	TPKFYP012LM140A	25	1 - 4
													HEATING	66.0	95.0	9.7	-								
FCU-04-09	CU-4	IT 235	WALL MOUNTED	HORI	HORI	WASHABLE	297	0	0%	N/A	DIRECT	VARIABLE SPEED	COOLING	70/58	55/51.9	10.3	7.6	208	1	60	0.2	15	TPKFYP012LM140A	25	1 - 4
													HEATING	66.0	95.0	9.7	-								
FCU-05-01	CU-5	BREAK 330	CEILING CONCEALED	HORI	HORI	--	371	85	11%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	52.5/50.7	10.3	7.8	208	1	60	1.2	15	TPEFYP012MA143A	49	1 - 4
													HEATING	68.0	89.4	9.2	-								
FCU-05-02	CU-5	OFFICE 333 (ARCHIVIST OFFICE)	CEILING CONCEALED	HORI	HORI	MERV13	371	29	4%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.5	10.3	7.8	208	1	60	1.2	15	TPEFYP012MA143A	49	1 - 4
													HEATING	68.0	91.1	9.2	-								
FCU-05-03	CU-5	OFFICE 337	CEILING CONCEALED	HORI	HORI	MERV13	371	36	5%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.9	10.3	7.8	208	1	60	1.2	15	TPEFYP012MA143A	49	1 - 4
													HEATING	68.0	88.0	9.2	-								
FCU-05-04	CU-5	OFFICE 338 (DIRECTOR OFFICE)	CEILING CONCEALED	HORI	HORI	MERV13	371	36	5%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.5	10.3	7.8	208	1	60	1.2	15	TPEFYP012MA143A	49	1 - 4
													HEATING	68.0	90.4	9.2	-								
FCU-05-05	CU-5	OFFICE 340	CEILING CONCEALED	HORI	HORI	MERV13 (C)	300	8	1%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/54	6.9	6.0	208	1	60	1.8	15	TPEFYP008MA144A	47	1 - 4
													HEATING	68.0	95.0	6.1	-								
FCU-05-06	CU-5	DARKROOM 357	CEILING CONCEALED	HORI	HORI	--	494	122	12%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.7	12.9	10.7	208	1	60	1.5	15	TPEFYP015MA143A	58	1 - 4
													HEATING	68.0	92.0	11.6	-								
FCU-05-07	CU-5	DIGITAL ARCHIVES 361	CEILING CONCEALED	HORI	HORI	--	600	79	7%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.8	15.5	12.9	208	1	60	2.9	15	TPEFYP018MA144A	58	1 - 4
													HEATING	68.0	95.0	13.6	-								
FCU-05-08	CU-5	OFFICE 35	CEILING CONCEALED	HORI	HORI	--	371	15	2%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/54	10.3	7.8	208	1	60	1.2	15	TPEFYP012MA143A	49	1 - 4
													HEATING	68.0	95.0	9.2	-								
FCU-05-09	CU-5	RECORDS MANAGEMENT 354	CEILING CONCEALED	HORI	HORI	--	300	67	11%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.9	6.9	6.0	208	1	60	1.8	15	TPEFYP008MA144A	47	1 - 4
													HEATING	68.0	95.0	6.1	-								
FCU-05-10	CU-5	CONFERENCE 351	CEILING CONCEALED	HORI	HORI	--	371	131	18%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	54.0/51.4	10.3	7.8	208	1	60	1.2	15	TPEFYP012MA143A	49	1 - 4
													HEATING	68.0	95.0	9.2	-								
FCU-05-11	CU-5	RESEARCH 350	CEILING CONCEALED	HORI	HORI	--	1,165	218	9%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.4	31.0	26.3	208	1	60	3.5	15	TPEFYP036MA143A	86	1 - 4
													HEATING	68.0	94.7	27.2	-								
FCU-05-12	CU-5	CORRIDOR	CEILING CONCEALED	HORI	HORI	--	300	16	3%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/54.4	5.2	5.2	208	1	60	1.1	15	TPEFYP006MA143A	49	1 - 4
													HEATING	68.0	87.9	4.6	-								
FCU-05-13	CU-5	ARCHIVES LOBBY	CEILING CONCEALED	HORI	HORI	--	371	187	25%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	50/48.8	10.3	7.8	208	1	60	1.2	15	TPEFYP012MA143A	49	1 - 4
													HEATING	68.0	88.9	9.2	-								
FCU-06-01	CU-6	CONSERVATION LAB 408	CEILING CONCEALED	HORI	HORI	MERV13	671	101	8%	1.0	DIRECT	VARIABLE SPEED	COOLING	74/62	54.9/54.4	18.2	14.4	208	1	60	2.1	15	TPEFYP024MH142A	100	1 - 4
													HEATING	68.0	95.0	20.0	-								
FCU-06-02	CU-6	COLLECTION STORAGE 431	CEILING CONCEALED	HORI	HORI	MERV13	600	135	11%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55.0/53.8	13.7	12.1	208	1	60	2.9	15	TPEFYP018MA144A	58	1 - 4
													HEATING	68.0	95.0	14.8	-								
FCU-06-03	CU-6	SCIENCE LAB 406	CEILING CONCEALED	HORI	HORI	MERV13	300	31	5%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.8	6.1	5.7	208	1	60	1.8	15	TPEFYP008MA144A	47	1 - 4
													HEATING	68.0	95.0	6.7	-								
FCU-06-04	CU-6	INCOMING COLLECTIONS 403	CEILING CONCEALED	HORI	HORI	MERV13	883	179	10%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/54	18.2	17.0	208	1	60	2.9	15	TPEFYP024MA144A	67	1 - 4
													HEATING	68.0	95.0	20.0	-								
FCU-07-01	CU-7	OFFICE 513	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	390	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.7	11.7	8.7	208	1	60	0.4	15	TPLFYP015FM140A	37	1 - 4
													HEATING	68.0	94.1	10.5	-								
FCU-07-02	CU-7	OFFICE 502	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	307	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.4	4.7	4.6	208	1	60	0.3	15	TPLFYP006BM140F	38	1 - 4
													HEATING	68.0	90.0	4.1	-								
FCU-07-03	CU-7	OFFICE 503	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	307	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.5	4.7	4.6	208	1	60	0.3	15	TPLFYP006BM140F	38	1 - 4
													HEATING	68.0	95.0	4.1	-								
FCU-07-04	CU-7	SEMINAR 504	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	335	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.7	9.4	7.1	208	1	60	0.3	15	TPLFYP012FM140A	37	1 - 4
													HEATING	68.0	94.8	8.3	-								
FCU-07-05	CU-7	OFFICE 505	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	315	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.2	6.3	5.6	208	1	60	0.3	15	TPLFYP008FM140A	34	1 - 4
													HEATING	68.0	86.7	5.6	-								
FCU-07-06	CU-7	OFFICE 506	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	390	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.28	11.7	8.7	208	1	60	0.4	15	TPLFYP015FM140A	37	1 - 4
													HEATING	68.0	95.0	10.5	-								
FCU-07-07	CU-7	OFFICE 507	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	307	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/54.3	4.7	4.6	208	1	60	0.3	15	TPLFYP006BM140F	38	1 - 4
													HEATING	68.0	93.9	4.1	-								
FCU-07-08	CU-7	CONFERENCE 508	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	460	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.9	14.1	10.5	208	1	60	0.5	15	TPLFYP018FM140A	37	1 - 4
													HEATING	68.0	95.0	12.4	-								
FCU-07-09	CU-7	OFFICE 510	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	460	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/52.8	14.1	10.5	208	1	60	0.5	15	TPLFYP018FM140A	37	1 - 4
													HEATING	68.0	95.0	12.4	-								
FCU-07-10	CU-7	RECEPTION 511	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	280	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.8	3.9	3.9	208	1	60	0.2	15	TPLFYP005FM140A	34	1 - 4
													HEATING	68.0	89.8	3.5	-								
FCU-07-11	CU-7	OFFICE 514	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	315	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.9	6.3	5.6	208	1	60	0.3	15	TPLFYP008FM140A	34	1 - 4
													HEATING	68.0	84.2	5.6	-								
FCU-07-12	CU-7	OFFICE 515	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	315	0	0%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.9	6.3	5.6	208	1	60	0.3	15	TPLFYP008FM140A	34	1 - 4
													HEATING	68.0	84.2	5.6	-								
FCU-07-13	CU-7	CONFERENCE 516	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	390	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.9	11.7	8.7	208	1	60	0.4	15	TPLFYP015FM140A	37	1 - 4
													HEATING	68.0	84.2	10.5	-								
FCU-07-14	CU-7	OFFICE 518	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	307	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.9	4.7	4.6	208	1	60	0.3	15	TPLFYP006BM140F	38	1 - 4
													HEATING	68.0	84.2	4.1	-								
FCU-07-15	CU-7	OFFICE 519	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	390	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.9	11.7	8.7	208	1	60	0.4	15	TPLFYP015FM140A	37	1 - 4
													HEATING	68.0	84.2	10.5	-								
FCU-07-16	CU-7	STORAGE 520	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	307	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.9	4.7	4.6	208	1	60	0.3	15	TPLFYP006BM140F	38	1 - 4
													HEATING	68.0	84.2	4.1	-								
FCU-07-17	CU-7	CORRIDOR 521	CEILING CONCEALED	HORI	HORI	--	300	181	30%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.9	4.7	4.7	208	1	60	1.8	15	TPEFYP006MA144A	47	1 - 4
													HEATING	68.0	84.2	4.1	-								
FCU-07-18	CU-7	RESEARCH 522	CEILING CONCEALED	HORI	HORI	--	600	181	15%	0.6	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.9	14.1	12.3	208	1	60	2.9	15	TPEFYP018MA144A	58	1 - 4
													HEATING	68.0	84.2	12.4	-								
FCU-07-19	CU-7	COLLECTION STORAGE 530	CEILING CASSETTE (FOUR-WAY)	HORI	HORI	WASHABLE	307	0	0%	0.0	DIRECT	VARIABLE SPEED	COOLING	74/62	55/53.9	4.7	4.6	208	1	60	0.3	15	TPLFYP006BM140F	38	1 - 4
													HEATING	68.0	84.2	4.1	-								

NOTES:
1. REFRIGERANT SHALL BE R-410A.
2. SEE MECHANICAL FLOOR PLANS FOR LOCATIONS
3. TAG NUMBERS INCLUDE ASSOCIATED CONDENSING UNIT: FCU - CONDENSING UNIT NUMBER - FAN COIL UNIT NUMBER
4. PROVIDE INTEGRAL CONDENSATE PUMP

NOTES

1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.

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STATE OF MAINE
STEVEN M. MARTEL
2/17/2022
7148
LICENSED
PROFESSIONAL ENGINEER

CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
C	ADDENDUM NO.3	02-17-2022
B	ADDENDUM NO. 2	02-08-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO: 3618208720
PROJECT MANAGER: KFM
A/E OF RECORD: SMM
DESIGNED BY: SMM
DRAWN BY: STR

SHEET TITLE:
MECHANICAL SCHEDULES

SHEET ID:
M-603

NOT FOR CONSTRUCTION

DUCTED DESICANT DEHUMIDIFIER SCHEDULE

TAG	SERVES	AIR STREAMS	AIR FLOW / CFM	OUTSIDE AIR / CFM	OUTSIDE AIR / % OF SA	STATIC PRESSURE / EXTERNAL IN WC	STATIC PRESSURE / TOTAL IN WC	BLOWER HP	ENTERING / DB °F	ENTERING / WB °F	ENTERING / RH	ENTERING / GR/LB	LEAVING / DB °F	LEAVING / WB °F	LEAVING / RH	LEAVING / GR/LB	FILTER (1) / MERV	FILTER (1) / THICKNESS INCH	ROTOR TYPE	DEHUMID CAPACITY LB/HR	ELECTRICAL / HEATER KW	VOLTS	PHASE	HZ	FLA AMPS	RLA AMPS	BASIS OF DESIGN / MFG	MODEL	WEIGHT LBS	NOTES
DH-1	RM 110	HVAC AIR FLOW	450	45	10%	2.0	4.2	1.5	50.0	37.5	25.0%	13.2	65.0	43.3	7.6	7.0	8	1	SILICA GEL DESICCANT	1.8	9.0	460	3	60	15.4	8.6	STULZ	DESICAiR DEZ-450-40	330	1, 2
		REACTIVATION AIR FLOW	150	N/A	N/A	0.8	3.2	0.3	70	58.5	50	54.4	N/A	N/A	N/A	N/A	8	1												

NOTES
1. FILTRATION IS THE SAME FOR BOTH AIR STREAMS.
2. PROVIDE UNIT MOUNTED DISCONNECT SWITCH

REVERSE OSMOSIS WATER TREATMENT EQUIPMENT

TAG	SERVES	WATER FLOW / OUTPUT GAL/DAY	WATER FLOW / CONTINUOUS GPM	WATER FLOW / DISCHARGE PSIG	WATER FLOW / TEMPERATURE DEG F	CARBON FILTER/WATER SOFTENER / BRINE TANK / QUANTITY	BRINE TANK / GALLONS	CARBON FILTER TANKS / QUANTITY	CARBON FILTER TANKS / CF/TANK	REVERSE OSMOSIS / PRE-FILTER	RO CARTRIDGES	RECOVERY RATE	ELECTRICAL / VOLTS	PHASE	MOCP AMPS	ACCESSORIES / BLADDER TANK GALLONS	DELIVERY PUMP / GPM	DELIVERY PUMP / PSI	DELIVERY PUMP / HP	BOD / MFG	BOD / MODEL	NOTES
RO-1	H-1, 2, 3	1,000	6	30	45 - 77	2	24	2	1.0	5 MICRON	3	41%	208	1	20	30	6	60	3/4	WATER CONTROL CORPORATION	H-1000-MTM1T-CW	1 ,2, 3, 4

NOTES:
1. INTERLOCK TO RUN WITH HUMIDIFIERS
2. PROVIDE COMPLETE SKID MOUNTED SYSTEM
3. ALL DOWNSTREAM CONNECTIONS SHALL BE MADE WITH PLASTIC PIPE (NO COPPER)
4. PROVIDE ULTRA-LOW ENERGY RO MEMBRANE CARTRIDGES FOR USE WITH COLD WATER...

EXPANSION TANK SCHEDULE

TAG	SERVICE	TYPE	CASING MATERIAL	CONNECTION SIZE (INCH)	PRESSURE RATING (PSI)	FLUID	SYSTEM VOLUME (GAL)	PRESSURE (PSI) MIN	PRESSURE (PSI) MAX	TEMPERATURE (°F) MIN	TEMPERATURE (°F) MAX	CALCULATED SYSTEM EXPANSION VOLUME (GAL)	TANK VOLUME REQUIRED (GAL)	TANK VOLUME (GAL)	ACCEPTANCE VOLUME (GAL)	TANK DIMENSIONS (INCH) DIAMETER	TANK DIMENSIONS (INCH) HEIGHT	BASIS OF DESIGN MFG	BASIS OF DESIGN MODEL	WEIGHT (LBS) TANK	WEIGHT (LBS) W/ FLUID	NOTES
ET-1	WATER / GLYCOL LOOP	BLADDER	STEEL	1.50	125	30% PG/ WATER	630	40	80	40	180	25.5	60	79	79	24	59.0	TACO	CA-300-125	320	978	1 - 5
ET-2	HEATING HOT WATER	BLADDER	STEEL	1.00	125	100% WATER	194	40	80	40	180	5.2	12	23	23	20	32.0	TACO	CA-90-125	120	312	1 - 5
ET-3	DOMESTIC HOT WATER	BLADDER	STEEL	0.75	150	100% WATER	100	40	125	40	180	2.7	7	8	5	14	24.8	TACO	PAX30-150	90	127	1 - 6

NOTES:
1. FABRICATE TANK PER ASME SECTION VIII.
2. TANK TO BE PRESSURIZED TO FACTORY STNADARD PRE-CHARGE (12 PSIG) WITH COMPRESSED AIR - SEE DETAIL.
3. PROVIDE BLADDER FAILURE SWITCH.
4. PROVIDE WITH SIGHT GLASS.
5. PRECHARGE WITH AIR TO MINIMUM PRESSURE SCHEDULED.
6. STAINLESS STEEL CONNECTION AND CORROSION RESISTANT CONSTRUCTION FOR POTABLE WATER SERVICE.

WATER HEATER SCHEDULE

TAG	SERVICE	DOMESTIC WATER / TANK SIZE GALLONS	CONNECTION SIZE (INCH) INLET	CONNECTION SIZE (INCH) OUTLET	HOT WATER HEAT EXCHANGER / FLOW RATE GPM	PRESSURE DROP FT	SURFACE AREA SQ. FT.	CAPACITY MBH	TEMPERATURE / EWT °F	LWT °F	TANK DIMENSIONS / DIAMETER INCH	HEIGHT INCH	BASIS OF DESIGN / MFG	MODEL	WEIGHT / TANK LB	FILLED LB	NOTES
WH-1	DOMESTIC WATER	78	1.5	1.5	24	10.0	68	360	170	140	23.5	72.0	HTP	SSU-80CN	175	651	1, 2, 3, 4

NOTES:
1. TANK RATED FOR 150 PSI WORKING PRESSURE.PROVIDE COMMERCIAL UNIT WITH DOUBLE HEAT EXCHANGER.
2. PROVIDE WITH THERMOSTATIC MIXING VALVE TO REDUCE DHW SUPPLY TEMPERATURE TO 105°F.
3. TANK INSULATED WITH MINIMUM 2 INCH THICK FOAM WITH PLASTIC JACKET.
4. PROVIDE TEMPERATURE AND PRESSURE RELIEF VALVE.

FIN TUBE RADIATOR SCHEDULE

TAG	SERVES	TYPE	ENCLOSURE / TOP	GRILL	HEIGHT INCH	DEPTH INCH	HEATING / CAPACITY BTUH/FT	ELEMENT / TUBE MATERIAL	TUBE DIAMETER INCH	FIN HEIGHT INCH	FIN DEPTH INCH	FINS/FT	ROWS	HOT WATER COIL / FLUID	EWT (°F)	LWT (°F)	FLOW (GPM)	WPD (FT OF H2O)	BASIS OF DESIGN / MFG	MODEL	NOTES
FT-1	LIBRARY UNDER ATRIUM	ARCHITECTUAL	FLAT	BAR GRILL	24	5.56	1,690	COPPER	1	4	4	40	2	WATER	170	150	6.5	0.2	STERLING	JDVB-24	1,2,3

NOTES:
1. STANDARD STEEL CASING WITH BAKED ENAMEL FINISH IN COLOR TO BE SELECTED BY ARCHITECT.
2. MOUNTING HEIGHT 4 INCH A.F.F.
3. CABINET CASING: 16 GAUGE COLD ROLLED STEEL, EXTRUDED ALUMINUM BAR GRILL

DOAS CONDENSING UNIT SCHEDULE

TAG	SERVES	FAN / QUANTITY	FAN / DRIVE TYPE	FAN / MOTOR HP	COMPRESSOR / QUANTITY	POWER / RLA	POWER / LRA	CAPACITY / HEATING MBH	COOLING / TOTAL MBH	COOLING / SENS. MBH	ELECTRICAL / VOLTS	PHASE	HZ	FLA AMPS	MCA AMPS	MFS AMPS	BASIS OF DESIGN / MFG MODEL	WEIGHT LBS	NOTES
CU-DOAS-1	DOAS-1	4	DIRECT	1.5	2	23	150	N/A	402.5	227.8	460	3	60	52.6	58.4	80	ADDISON MCOA 360 C4	1,978	1,2,3,4,6,7
CU-DOAS-2	DOAS-2	2	DIRECT	1.5	2	10	62	N/A	171.1	98.0	460	3	60	22.6	25	30	ADDISON MCOA 150 B2	1,293	1,2,3,5,6,7
CU-DOAS-3	DOAS-3	2	DIRECT	1.5	2	18	125	N/A	311.1	173.9	460	3	60	39	43.5	60	ADDISON MCOA 240 B2	1,930	1,2,3,4,6,7

NOTES:
1. FUSED DISCONNECT WITH 65K SCCR - SEE ELECTRICAL DRAWINGS
2. REFRIGERANT SHALL BE R410A
3. PROVIDE WITH INTERNAL HOT GAS BYPASS
4. PROVIDE WITH DUAL SCROLL, DUAL CIRCUIT WITH LEAD CIRCUIT VFD
5. PROVIDE WITH SINGLE DIGITAL SCROLL AND SINGLE SCROLL/DUAL CIRCUIT
6. PROVIDE WITH SIGHT GLASS
7. PROVIDE CONDENSER FANS WITH EC MOTORS

UNIT HEATER SCHEDULE

TAG	SERVES	TYPE	HEATING / MBH	EAT (°F)	LAT (°F)	AIR / SA CFM	DISCHARGE	THROW (FT)	MOUNTING HEIGHT (FT)	HOT WATER / FLUID	EWT (°F)	LWT (°F)	FLOW (GPM)	WPD (FT WC)	CONNECTIONS (INCH)	FAN / FAN TYPE	DIAMETER (INCH)	DRIVE	RPM	HP	POWER / VOLTS	PH	MCA (AMPS)	MOCP (AMPS)	BASIS OF DESIGN / TRANE MODEL	DIMENSIONS (INCH) W	D	H	WEIGHT (LBS)	NOTES
UH-1	B5 MECHANICAL ROOM	HORIZONTAL	18	60	81	815	HORIZONTAL	22	9	WATER	170	140	1.2	0.1	1-1/4	PROPELLER	13.50	DIRECT	1,550	1/20	120	1	2.6	15	60-S	24.00	17.00	17.00	55	1
UH-2	LOADING DOCK	HORIZONTAL	97	60	89	3,299	HORIZONTAL	40	15	30% PG	170	140	6.8	0.4	1-1/2	PROPELLER	19.75	DIRECT	1,100	1/4	120	1	4.5	15	230-S	39.38	23.00	32.25	190	1
UH-3	LIBRARY MECHANICAL ROOM	VERTICAL	135	40	70	4,430	DOWN	12	12	30% PG	170	140	9.5	1.0	2	PROPELLER	25.25	DIRECT	1,100	1/2	120	1	6.8	15	280-P	37.50	37.50	15.25	135	1
UH-4	LIBRARY MECHANICAL ROOM	VERTICAL	139	40	71	4,430	DOWN	12	12	30% PG	170	140	9.8	1.0	2	PROPELLER	25.25	DIRECT	1,100	1/2	120	1	6.8	15	280-P	37.50	37.50	15.25	135	1
UH-5	LIBRARY MECHANICAL ROOM	VERTICAL	139	40	71	4,430	DOWN	12	12	30% PG	170	140	9.8	1.0	2	PROPELLER	25.25	DIRECT	1,100	1/2	120	1	6.8	15	280-P	37.50	37.50	15.25	135	1
UH-6	LIBRARY MECHANICAL ROOM	VERTICAL	100	40	63	4,162	DOWN	12	12	30% PG	170	140	7.0	0.8	2	PROPELLER	25.25	DIRECT	1,100	1/4	120	1	4.5	15	252-P	37.50	37.50	15.13	135	1
UH-7	LIBRARY MECHANICAL ROOM	VERTICAL	100	40	63	4,162	DOWN	12	12	30% PG	170	140	7.0	0.8	2	PROPELLER	25.25	DIRECT	1,100	1/4	120	1	4.5	15	252-P	37.50	37.50	15.13	135	1
UH-8	ARCHIVES MECHANICAL ROOM	VERTICAL	128	40	70	4,162	DOWN	12	12	30% PG	170	140	9.0	0.8	2	PROPELLER	25.25	DIRECT	1,100	1/4	120	1	4.5	15	252-P	37.50	37.50	15.13	135	1
UH-9	ARCHIVES MECHANICAL ROOM	VERTICAL	153	40	69	5,210	DOWN	12	12	30% PG	170	140	10.8	1.3	2	PROPELLER	25.25	DIRECT	1,140	3/4	480	3	2.0	15	336-P	37.50	37.50	16.75	135	1
UH-10	ARCHIVES WATER ENTRANCE...	HORIZONTAL	12	60	74	815	HORIZONTAL	22	9	30% PG	170	140	0.8	0.1	1-1/4	PROPELLER	13.50	DIRECT	1,550	1/20	120	1	2.6	15	60-S	24.00	17.00	17.00	55	1
UH-11	MUSEUM MECHANICAL ROOM	HORIZONTAL	75	40	71	2,380	HORIZONTAL	40	14	30% PG	170	140	5.3	1.2	1-1/2	PROPELLER	19.75	DIRECT	1,100	1/6	120	1	2.9	15	168-S	33.75	22.00	26.25	145	1
UH-12	MUSEUM MECHANICAL ROOM	HORIZONTAL	158	40	74	4,480	HORIZONTAL	50	15	30% PG	170	140	11.1	1.2	1-1/2	PROPELLER	25.25	DIRECT	1,100	1/2	120	1	6.8	15	320-S	52.13	25.00	32.25	190	1
UH-13	MUSEUM MECHANICAL ROOM	HORIZONTAL	40	40	65	1,535	HORIZONTAL	28	9	30% PG	170	140	2.8	0.2	1-1/4	PROPELLER	16.75	DIRECT	1,100	1/8	120	1	2.1	15	100-S	26.75	18.75	20.25	85	1

NOTES:
1. ACTUAL MBH IS THE CATALOG MBH RATED FOR ENTERING AIR TEMPERATURE (EAT) AND ENTERING AND LEAVING WATER TEMPERATURE LISTED.

PUMP SCHEDULE

TAG	SERVICE	TYPE	FLUID	CASING MATERIAL	FLOW GPM	HEAD FT H20	EFFICIENCY	CONNECTION / TYPE	SUCTION (INCH)	DISCHARGE (INCH)	IMPELLER DIAMETER (INCH)	MOTOR / CONTROL	HP	RPM	BHP	POWER / VOLTS	PHASE	HZ	BASIS OF... / MFG	MODEL	WEIGHT (LBS.)	NOTES
P-1	GLYCOL LOOP TO DOAS, AHU'S, UH'S	BASE -MOUNTED END SUCTION	30% PROPYLENE GLYCOL / WATER	CAST IRON	235	45	77%	FLANGES	3	2-1/2	7.75	VFD	5	1,760	3.58	480	3	60	TACO	2510C	542	1,2,3,4,5
P-2	GLYCOL LOOP TO DOAS, AHU'S, UH'S	BASE -MOUNTED END SUCTION	30% PROPYLENE GLYCOL / WATER	CAST IRON	235	45	77%	FLANGES	3	2-1/2	7.75	VFD	5	1,760	3.58	480	3	60	TACO	2510C	542	1,2,3,4,5
P-3	100% WATER LOOP TO VAV'S, CONVECTORS	BASE -MOUNTED END SUCTION	100% WATER	CAST IRON	65	39	67%	FLANGES	2	1-1/4	7.25	VFD	2	1,760	0.96	480	3	60	TACO	1207D	226	1,2,3,4,5
P-4	100% WATER LOOP TO VAV'S, CONVECTORS	BASE -MOUNTED END SUCTION	100% WATER	CAST IRON	65	39	67%	FLANGES	2	1-1/4	7.25	VFD	2	1,760	0.96	480	3	60	TACO	1207D	226	1,2,3,4,5
P-5	RECIRCULATION HOT WATER	INLINE	100% WATER	COMPOSITE	5	11	-	UNION	1	1	-	ECM	1/40	1,590-4,830	-	115	1	60	TACO	006e3	3.5	6

NOTES:
1. PROVIDE SELF-SENSING SPEED CONTROL AND BACNET INTERFACE FOR BAS.
2. VFD PROVIDED BY PUMP MANUFACTURER WITH INTEGRAL POWER DISCONNECT SWITCH
3. PROVIDE FLANGES TO MATCH PUMP TO PIPE SIZE.
4. PROVIDE WITH 1/4 INCH NPT PRESSURE GAUGE PORTS.
5. PROVIDE WITH SUCTION DIFFUSER WITH STRAINER SIZED TO MATCH INLET PIPE AND PUMP SUCTION.
6. DOMESTIC HOT WATER CIRCULATION PUMP FOR OPEN LOOP POTABLE WATER SERVICE WITH 3 SPEED CONTROL

HUMIDIFIER SCHEDULE

TAG	SERVES	AIRFLOW CFM	DUCT SIZE INCHES	DUCT VELOCITY FPM	ENTERING AIR / TEMPERATURE °F DB	TEMPERATURE °F WB	HUMIDITY GR/LB	LEAVING AIR / TEMPERATURE °F DB	TEMPERATURE °F WB	HUMIDITY RH	INLET WATER GPH	CAPACITY / LOAD LB/HR	OUTPUT LB/HR	DISPERSION TUBES / LENGTH INCH	INLET INCH	OUTLET INCH	ROWS	NON-WETTING DISTANCE INCH	CONTROL	POWER / VOLTS	PHASE	HZ	KW	FLA	MOCP	MFG	STEAM GENERATOR MODEL	DISPERSION TUBE MODEL	OPERATING WEIGHT (LBS)	NOTES
H-1	DOAS-1	7,550	36x24	1,258	68.0	49.7	24.7	68.6	55.3	40%	11.5	95.0	102.0	40.0	2.0	2.0	1	20	SSR SEQUENCING	480	3	60	34	40.9	60	DRISTEEM	VAPORMIST VM-34	SINGLE TUBE	160	1, 2, 3, 4, 5, 6
H-2	DOAS-2	3,450	30x16	1,035	68.0	49.7	24.8	68.6	55.3	40%	5.3	43.6	48.0	34.0	2.0	2.0	1	13	SSR SEQUENCING	480	3	60	16	19.2	25	DRISTEEM	VAPORMIST VM-16	SINGLE TUBE	75	1, 2, 3, 4, 5, 6
H-3	DOAS-3	5,200	30x20	1,248	68.0	49.7	24.8	68.7	55.3	40%	7.9	65.7	75.0	30.0	2.0	2.0	1	17	SSR SEQUENCING	480	3	60	25	30.1	40	DRISTEEM	VAPORMIST VM-25	SINGLE TUBE	156	1, 2, 3, 4, 5, 6

NOTES:
1. PROVIDE INSULATED STEAM PIPE AND DISPERSION TUBE PER MANUFACTURER'S INSTRUCTIONS.
2. PROVIDE INTEGRAL CONTROLS WITH BACNET INTERFACE INCLUDING MODULATING SSR SEQUENCING CONTROL, DUCT HIGH LIMIT HUMIDISTAT, AIR FLOW PROVING SWITCH, INPUT FOR DUCT HUMIDITY SENSOR BY BAS, AND ASSOCIATED CONTROLS AND WIRING.
3. HUMIDIFIERS WILL BE SUPPLIED WITH RO WATER.
4. DISPERSION TUBES SHALL BE INSTALLED IN STRAIGHT DUCT TO PROVIDE MANUFACTURER'S MINIMUM ABSORPTON DISTANCE.
5. PROVIDE INSULATED TANK AND DISPERSION TUBES FABRICATED OF 316 STAINILESS STEEL
6. PROVIDE DISCHARGE WATER COOLER - DRANE-KOOLER OR APPROVED EQUAL

HEAT EXCHANGER SCHEDULE

TAG	SERVICE	TYPE	SHELL / MATERIAL	SHELL / DIAMETER (INCH)	SHELL / LENGTH (FEET)	TUBES / MATERIAL	TUBES / DIAMETER (INCH)	TUBES / PASSES	HEADER MATERIAL	HEAT (MBH)	SOURCE FLUID / FLUID	HX SIDE	FLOW (LB/HR)	PRESSURE (PSI)	TEMP (°F)	CONNECTION. SIZE (INCH) INLET	CONNECTION. SIZE (INCH) OUTLET	SUPPLY FLUID / CONTROL	FLUID	HX SIDE	FLOW (GPM)	WPD (PSI)	EWT (°F)	LWT (°F)	CONNECTION SIZE (INCH)	SURFACE AREA (SF)	BASIS OF DESIGN / MFG & MODEL	WEIGHT (LBS)	NOTES
HX-1	GLYCOL HEATING LOOP	SHELL & TUBE	STEEL	14	6	COPPER	3/4	2	STEEL	3,499	STEAM	SHELL	3,613	5.0	227	6" FLANGED	2" THREADED	THERMOSTATIC CONTROL VALVES	30% PROPYLENE GLYCOL	TUBES	235	0.7	136.0	170.0	6" FLANGED	156	TACO E14212-S	847	1, 2, 3, 5
(E) HX-2	HOT WATER LOOP	SHELL & TUBE	STEEL	8	7	COPPER	3/4	2	STEEL	830	STEAM	SHELL	1,260	5.0	227	4" FLANGED	1-1/4" THREADED	THERMOSTATIC CONTROL VALVES	WATER	TUBES	65	0.5	144.4	170.0	3" THREADED	63	TACO E8214-S	390	1, 2, 3, 4

NOTES:
1. SOURCE FLUID IS PLANT STEAM AT 5 PSIG
2. INCLUDES FOULING FACTOR OF 0.0010
3. GLYCOL/HOT WATER LOOP TEMPERATURE CONTROL SHALL BE PROVIDED BY BAS
4. EXISTING HX AND SUPPORT STAND TO BE REUSED
5. PROVIDE SADDLES AND SUPPORT STAND

NOTES

1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.

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STATE OF MAINE PROFESSIONAL ENGINEER STEVEN M. MARTEL 7148 LICENSED 2/17/2022

CURRENT ISSUE STATUS: PHASE 2 - ISSUED FOR BID JANUARY 7, 2022

PROJECT: STATE OF MAINE CULTURAL BUILDING ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
B	ADDENDUM NO.3	02-17-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO: 3618208720
PROJECT MANAGER: KFM
A/E OF RECORD: SMM
DESIGNED BY: SMM
DRAWN BY: STR

SHEET TITLE: MECHANICAL SCHEDULES

SHEET ID: M-604

NOT FOR CONSTRUCTION

AIR HANDLING UNIT SCHEDULE

TAG	SERVES	AIR FLOW: SUPPLY AIR MAX (CFM)	AIR FLOW: MINIMUM OUTSIDE AIR (CFM)	FAN: SERVICE	STATIC PRESSURE: ESP (IN WC)	STATIC PRESSURE: TOTAL (IN WC)	DRIVE: TYPE	DRIVE: CONTROL	DRIVE: DESIGN (HZ)	WHEEL: TYPE	WHEEL: NUMBER OF FANS	WHEEL: DIAMETER (INCH)	WHEEL: RPM	MOTOR: BHP EACH	MOTOR: MHP EACH	MOTOR: NOMINAL RPM
AHU-1	EXHIBIT LEVELS 1 & 2	6,600	2,110	RETURN	1.50	1.92	DIRECT	VFD	62	PLENUM AIRFOIL	1	20.00	1,455	3.9	5.0	1,800
				SUPPLY	2.00	4.61	DIRECT	VFD	76	PLENUM AIRFOIL	1	20.00	2,248	7.6	10	1,800
AHU-2	EXHIBIT LEVEL 3	4,700	1,230	RETURN	1.50	1.80	DIRECT	VFD	73	PLENUM AIRFOIL	1	18.25	2,140	3.0	5.0	1,800
				SUPPLY	2.00	4.76	DIRECT	VFD	79	PLENUM AIRFOIL	1	18.25	2,341	5.6	7.5	1,800
AHU-3	EXHIBIT LEVEL 4	4,400	980	SUPPLY	2.00	4.68	DIRECT	VFD	69	PLENUM AIRFOIL	1	22.25	2,026	9.5	10.0	1,800
AHU-4	ATRIUM	7,500	770	SUPPLY	1.50	3.42	DIRECT	VFD	60	PLENUM AIRFOIL	1	20.00	2,042	6.3	7.5	1,800

TAG	FILTERS: FILTER TYPE	MERV	DEPTH (INCH)	APD (10) (IN WC)	AREA (SF)	COILS AIR: COIL TYPE	EAT °F DB	EAT °F WB	LAT °F DB	LAT °F WB	APD (IN WC)	FLUID: FLUID	EWT (°F)	LWT (°F)	FLOW (GPM)	WPD (FT)	COIL: AREA (SF)	ROWS	FINS (FPF)	CAPACITY: TOTAL MBH	SENS MBH
AHU-1	PRE	8	2	0.65	13.44	VRF COOLING	72.0	62.0	54.0	52.7	0.42	R-410A	N/A	N/A	N/A	N/A	13.4	4	144	161	118
AHU-1	FINAL	15	12	0.83	13.44	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AHU-2	PRE	8	2	0.67	8.67	VRF COOLING	72.0	62.0	55.0	53.5	0.70	R-410A	N/A	N/A	N/A	N/A	10	4	158	131	88
AHU-2	FINAL	15	12	0.62	18.89	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AHU-3	PRE	8	2	0.63	18.89	VRF COOLING	72.0	63.0	55.0	53.5	0.76	R-410A	N/A	N/A	N/A	N/A	6.1	4	163	84	56
AHU-3	FINAL	14	12	0.80	18.89	HYDRONIC HEATING	65.0	N/A	89.8	N/A	0.02	30% GLYCOL	170	140	2.8	0.39	5.3	1	80	40	N/A
AHU-4	PRE	8	2	0.01	-	DX COOLING	76.2	63.4	51.2	51.0	0.35	R-410A	N/A	N/A	N/A	N/A	17.4	4	15	209	191
AHU-4	FINAL	14	4	0.82	-	HYDRONIC HEATING	64.5	N/A	95.0	N/A	0.39	30% GLYCOL	170	140	16.3	0.50	17.4	2	12	233	N/A

AIR HANDLING UNIT SCHEDULE (CONTINUED)

TAG	SERVES	ARRANGEMENT: ACCESS SIDE	BASE RAIL HEIGHT (INCH)	POWER SUPPLY: LOAD	VOLTS	PHASE	HZ	CURRENT: FLA (AMPS)	MCA (AMPS)	MOCP (AMPS)	BASIS OF DESIGN: MFG	MODEL	WEIGHT (LBS)	NOTES
AHU-1	EXHIBIT LEVELS 1 & 2	LEFT	6	UNIT	480	3	60	22.20	25.70	35	TRANE	CSAA014	2,814	1, 2, 3, 4, 6, 7, 8, 9, 12
				LIGHTS	120	1	60	2.61	3.26	15				
				RECEPTACLE	120	1	60	8.00	10.00	15				
				LEV	208	1	60	0.06	--	15				
				LEV	208	1	60	0.06	--	15				
AHU-2	EXHIBIT LEVEL 3	LEFT	6	UNIT	480	3	60	19.20	21.95	30	TRANE	CSAA010	2,449	1, 2, 3, 4, 6, 7, 8, 9, 12
				LIGHTS	120	1	60	2.61	3.26	15				
				RECEPTACLE	120	1	60	8.00	10.00	15				
				LEV	208	1	60	0.06	--	15				
				LEV	208	1	60	0.06	--	15				
AHU-3	EXHIBIT LEVEL 4	LEFT	6	UNIT	480	3	60	8.20	10.25	30	TRANE	CSAA006	1,540	1, 2, 3, 4, 6, 7, 8, 9, 12
				LIGHTS	120	1	60	2.61	3.26	15				
				RECEPTACLE	120	1	60	8.00	10.00	15				
				LEV	208	1	60	0.06	--	15				
AHU-4	ATRIUM	-	6	UNIT	480	3	60	40.80	44.00	50	TRANE	OADG017F3	3,130	1, 2, 3, 4, 5, 8, 9, 10, 11
				-	-	-	-	-	-	-		ANPA 20		

NOTES
1. PROVIDE FACTORY WIRED LED MARINE TYPE LIGHTS IN FAN SECTIONS WITH LIGHT SWITCH & CONVENIENCE OUTLET ON OUTSIDE OF UNIT CASING.
2. PROVIDE 115 VOLT - 15 AMP CIRCUIT FOR UNIT LIGHTS & CONVENIENCE OUTLET.
3. PROVIDE UNIT MOUNTED VFDS.
4. MID-LIFE FILTER PRESSURE DROP LISTED FOR FILTERS AND USED FOR FAN PERFORMANCE RATING.
5. ROOFTOP UNIT WITH INTEGRAL COOLING COMPRESSORS AND CONDENSERS.
6. PROVIDE INLET BELL AND PERFORATED PANELS ON FAN SECTIONS TO REDUCE NOISE.
7. PROVIDE LEV KIT AND REFRIGERANT CIRCUITING TO MATCH VRF CONDENSING UNIT. REQUIRES DEDICATED 208V/1PH CIRCUIT.
8. PROVIDE WITH DUCT MOUNTED SMOKE DETECTOR.
9. PROVIDE WITH CONDENSATE OVERFLOW SWITCH.
10. PROVIDE UNIT MANUFACTURER'S CURB WITH MINIMUM 21 INCH HIGH HORIZONTAL DISCHARGE CURB EXTENSION. CURBS SHALL BE GALVANIZED STEEL WITH 1 INCH THICK FOIL FACED INSULATION.
11. PROVIDE FULL MODULATION OUTSIDE AIR DAMPER.
12. PROVIDE PIEZOMETER AIRFLOW MEASURING TAPS IN THE FAN WITH TRANSDUCERS TO CONVERT DIFFERENTIAL PRESSURE TO CFM

C

CONDENSING UNIT SCHEDULE

TAG	SERVES	# OF MODULES	CONDENSER AIR FLOW: # FANS	TOTAL CFM	ESP IN WC	CAPACITY: COOLING MBH	HEATING MBH	COOLING EFFICIENCY IEER / EER	HEATING OUTDOOR TEMP DEG F	COOLING OUTDOOR TEMP DEG F	REFRIGERANT CHARGE PER MODULE: FACTORY LBS	FIELD ADDED LBS	TOTAL LBS	ELECTRICAL PER MODULE: VOLTS	PHASE	HZ	MCA AMPS	MOCP AMPS	BASIS OF DESIGN: MITSUBISHI MODEL	WEIGHT LBS	NOTES
CU-1	FIRST FLOOR LIBRARY	1	2	9,200	0.32	129	112	25.9 / 11.6	33.6	88.0	24	63.1	87	460	3	60	20	30	TURYP1444AN40AN	715	1 - 5
CU-2	SECOND FLOOR LIBRARY	2	4	19,100	0.32	254	247	24.25 / 10.55	33.6	88.0	24	95.8	120	460	3	60	20	30	TURYP2884BN40AN	1,364	1 - 5
CU-3	THIRD FLOOR LIBRARY	2	4	14,800	0.32	171	176	27.5 / 12.7	33.6	88.0	11	52.7	63	460	3	60	15	20	TURYP1924BN40AN	1,222	1 - 5
CU-4	FIRST/SECOND FLOOR ARCHIVES	1	2	9,200	0.32	128	121	27.5 / 12.9	33.6	88.0	23	40.1	63	460	3	60	21	35	TUHYE1444AN40AN	715	1 - 5
CU-5	THIRD FLOOR ARHIVES	1	2	14,850	0.32	151	133	23.55 / 10.8	33.6	88.0	24	57.0	81	460	3	60	28	40	TURYP1684AN40AN	774	1 - 5
CU-6	FOURTH FLOOR MUSEUM	1	1	6,000	0.32	56	62	26.5 / 13.9	33.6	88.0	11	42.5	54	460	3	60	11	15	TURYP0724AN40AN	552	1 - 5
CU-7	FIFTH FLOOR MUSEUM	1	2	14,850	0.32	144	132	23.55 / 110.8	33.6	88.0	24	69.7	93	460	3	60	28	40	TURYP1684AN40AN	774	1 - 5
CU-8	AHU-1	2	4	13,400	0	185	112	28.15 / 13	-7.5	95.0	22	20.0	42	460	3	60	15	20	TUHYP1924BN40AN	1,210	1 - 3, 5
CU-9	AHU-2	2	4	13,400	0	185	112	28.15 / 13	-7.5	95.0	22	20.0	42	460	3	60	15	20	TUHYP1924BN40AN	1,210	1 - 3, 5
CU-10	AHU-3	1	2	6,700	0	95	57	29.4 / 14	-7.5	95.0	22	8.7	30	460	3	60	15	20	TUHYP0964AN40AN	605	1 - 3, 5

NOTES:
1. TWO DIRECT DRIVE CONDENSER FANS SHALL BE INVERTER CONTROLLED AND BRUSHLESS DC MOTOR.
2. PROVIDE WITH PANEL HEATER KIT
3. USES R-410A AS REFRIGERANT.
4. PROVIDE WITH EXTERNAL STATIC PRESSURE OPTION.
5. DISCONNECT SWITCH(ES) BY DIV 26

CONTROL DAMPERS SCHEDULE

TAG	LOCATION	SERVES	MATERIAL	TYPE	BLADE ACTION	AIRFLOW: DIRECTION	AIRFLOW PER DAMPER (CFM)	TOTAL AIRFLOW (CFM)	NUMBER OF DAMPERS	DEPTH (INCH)	WIDTH (INCH)	HEIGHT (INCH)	APD (IN WC)	BASIS OF DESIGN: MFG	MODEL	NOTES
D-1A	LIBRARY MECH 315	CU-1	ALUMINUM	INSULATED AIRFOIL	PARALLEL	EXHAUST	9,200	9,200	1	5	48	30	0.07	GREENHECK	ICD-45	1, 2, 3, 4
D-1B	LIBRARY MECH 315	CU-1	ALUMINUM	INSULATED AIRFOIL	PARALLEL	INTAKE	9,200	9,200	1	5	48	30	0.07	GREENHECK	ICD-45	1, 2, 3
D-1C	LIBRARY MECH 315	CU-1	GALV STEEL	3V BLADE	PARALLEL	RETURN	9,200	9,200	1	5	48	30	0.02	GREENHECK	VCD-20	2, 3
D-2A	LIBRARY MECH 315	CU-2	ALUMINUM	INSULATED AIRFOIL	PARALLEL	EXHAUST	9,550	19,100	2	5	48	30	0.07	GREENHECK	ICD-45	1, 2, 3, 4
D-2B	LIBRARY MECH 315	CU-2	ALUMINUM	INSULATED AIRFOIL	PARALLEL	INTAKE	9,550	19,100	2	5	48	30	0.07	GREENHECK	ICD-45	1, 2, 3
D-2C	LIBRARY MECH 315	CU-2	GALV STEEL	3V BLADE	PARALLEL	RETURN	9,550	19,100	2	5	48	30	0.02	GREENHECK	VCD-20	2, 3
D-3A	LIBRARY MECH 315	CU-3	ALUMINUM	INSULATED AIRFOIL	PARALLEL	EXHAUST	7,400	14,800	2	5	48	30	0.04	GREENHECK	ICD-45	1, 2, 3, 4
D-3B	LIBRARY MECH 315	CU-3	ALUMINUM	INSULATED AIRFOIL	PARALLEL	INTAKE	7,400	14,800	2	5	48	30	0.04	GREENHECK	ICD-45	1, 2, 3
D-3C	LIBRARY MECH 315	CU-3	GALV STEEL	3V BLADE	PARALLEL	RELIEF	7,400	14,800	2	5	48	30	0.02	GREENHECK	VCD-20	2, 3
D-4A	ARCHIVES MECH 348	CU-4	ALUMINUM	INSULATED AIRFOIL	PARALLEL	EXHAUST	9,200	9,200	1	5	48	30	0.05	GREENHECK	ICD-45	1, 2, 3, 4
D-4B	ARCHIVES MECH 348	CU-4	ALUMINUM	INSULATED AIRFOIL	PARALLEL	INTAKE	9,200	9,200	1	5	48	30	0.05	GREENHECK	ICD-45	1, 2, 3
D-4C	ARCHIVES MECH 348	CU-4	GALV STEEL	3V BLADE	PARALLEL	RELIEF	9,200	9,200	1	5	48	30	0.02	GREENHECK	VCD-20	2, 3
D-5A	ARCHIVES MECH 348	CU-5	ALUMINUM	INSULATED AIRFOIL	PARALLEL	EXHAUST	7,425	14,850	2	5	48	30	0.07	GREENHECK	ICD-45	1, 2, 3, 4
D-5B	ARCHIVES MECH 348	CU-5	ALUMINUM	INSULATED AIRFOIL	PARALLEL	INTAKE	7,425	14,850	2	5	48	30	0.07	GREENHECK	ICD-45	1, 2, 3
D-5C	ARCHIVES MECH 348	CU-5	GALV STEEL	3V BLADE	PARALLEL	RELIEF	7,425	14,850	2	5	48	30	0.02	GREENHECK	VCD-20	2, 3
D-6A	MUSEUM MECH 416, L-8	CU-6	ALUMINUM	INSULATED AIRFOIL	PARALLEL	EXHAUST	6,000	6,000	1	5	82	76	0.04	GREENHECK	ICD-45	1, 2, 3, 4
D-6B	MUSEUM MECH 416, L-11	CU-6	ALUMINUM	INSULATED AIRFOIL	PARALLEL	INTAKE	6,000	6,000	1	5	40	76	0.04	GREENHECK	ICD-45	1, 2, 3
D-6C	MUSEUM MECH 416	CU-6	GALV STEEL	3V BLADE	PARALLEL	RELIEF	6,000	6,000	1	5	48	30	0.02	GREENHECK	VCD-20	2, 3
D-7A	MUSEUM MECH 416, L-7	CU-7	ALUMINUM	INSULATED AIRFOIL	PARALLEL	EXHAUST	14,850	14,850	1	5	82	76	0.07	GREENHECK	ICD-45	1, 2, 3, 4
D-7B	MUSEUM MECH 416, L-9	CU-7	ALUMINUM	INSULATED AIRFOIL	PARALLEL	INTAKE	14,850	14,850	1	5	82	76	0.07	GREENHECK	ICD-45	1, 2, 3
D-7C	MUSEUM MECH 416	CU-7	GALV STEEL	3V BLADE	PARALLEL	RELIEF	7,425	14,850	2	5	48	30	0.02	GREENHECK	VCD-20	2, 3
D-8	CONSERVATION LAB 408	SF-1	ALUMINUM	INSULATED AIRFOIL	PARALLEL	INTAKE	4,000	4,000	1	5	34	24	0.12	GREENHECK	ICD-45	1, 2, 3, 5
D-9	ELEC SERVICE ENTRANCE 234	PAINT BOOTH	ALUMINUM	INSULATED AIRFOIL	PARALLEL	INTAKE	7,000	7,000	1	5	48	20	0.25	GREENHECK	ICD-45	1, 2, 3, 6
D-10	MUSEUM MECH 416, L-12	ERV-3	ALUMINUM	INSULATED AIRFOIL	PARALLEL	INTAKE	5,600	5,600	1	5	24	28	0.20	GREENHECK	ICD-45	1, 2, 3
D-11	MUSEUM MECH 416, L-10	ERV-3	GALV STEEL	3V BLADE	PARALLEL	EXHAUST	5,040	5,040	1	5	28	24	0.20	GREENHECK	VCD-20	2, 3
D-12	ARCHIVES MECH 348	ERV-2	ALUMINUM	INSULATED AIRFOIL	PARALLEL	INTAKE	3,450	3,450	1	5	28	18	0.20	GREENHECK	ICD-45	1, 2, 3
D-13	ARCHIVES MECH 348	ERV-2	GALV STEEL	3V BLADE	PARALLEL	EXHAUST	3,105	3,105	1	5	30	18	0.20	GREENHECK	VCD-20	2, 3
D-14	LIBRARY MECH 315	ERV-1	ALUMINUM	INSULATED AIRFOIL	PARALLEL	INTAKE	7,550	7,550	1	5	36	36	0.20	GREENHECK	ICD-45	1, 2, 3
D-15	LIBRARY MECH 315	ERV-1	GALV STEEL	3V BLADE	PARALLEL	EXHAUST	6,795	6,795	1	5	54	18	0.20	GREENHECK	VCD-20	2, 3
D-16	ELEC SERVICE ENTRANCE 234	ERV-4	ALUMINUM	INSULATED AIRFOIL	PARALLEL	INTAKE	800	800	1	5	8	24	0.20	GREENHECK	ICD-45	1, 2, 3
D-17	MUSEUM MECH 416	AHU-1 EXHAUST	GALV STEEL	3V BLADE	PARALLEL	EXHAUST	1,900	1,900	1	5	28	16	0.20	GREENHECK	VCD-20	2, 3
D-18	MUSEUM MECH 416	AHU-2 EXHAUST	GALV STEEL	3V BLADE	PARALLEL	EXHAUST	1,110	1,110	1	5	28	10	0.20	GREENHECK	VCD-20	2, 3
D-19	MUSEUM MECH 416	AHU-3 EXHAUST	GALV STEEL	3V BLADE	PARALLEL	EXHAUST	880	880	1	5	18	12	0.20	GREENHECK	VCD-20	2, 3
D-20	BASEMENT STORAGE B11	ERV-4	ALUMINUM	INSULATED AIRFOIL	PARALLEL	INTAKE	800	800	1	5	36	24	0.20	GREENHECK	ICD-45	1, 2, 3

NOTES:
1. DAMPER TO BE LOW LEAKAGE THERMALLY INSULATED.
2. QUICK CONNECT FRAME.
3. CONTROL DAMPER SIZE TO BE SAME AS CONNECTED DUCT SIZE.
4. INTERLOCK DAMPER OPERATION WITH ASSOCIATED CONDENSING UNIT MODULE.
5. DAMPER SHALL OPEN WHEN SF-1 OPERATES.
6. DAMPER SHALL OPEN WHEN PAINT BOOTH EXHAUST FAN OPERATES

VAV BOX SCHEDULE

TAG	SERVES	DESCRIPTION	INLET DIAMETER (INCH)	DESIGN AIRFLOW: MAX (CFM)	MIN (CFM)	MAX APD (IN WG)	# COIL ROWS	CAPACITY (MBH)	FLOW (GPM)	EAT (DEG F)	LAT (DEG F)	EWT (DEG F)	LWT (DEG F)	MAX WPD (FT HD)	BASIS OF DESIGN: MFG	MODEL	NOTES
VAV 1-1	AHU-1, FLOORS 1 & 2 INTERIOR	SINGLE DUCT VAV TERMINAL BOX	12	1,300	650	0.2	1	27.6	2.8	65	85.0	170	150	4.3	TRANE	VCWF	1,2,3,4,5,7
VAV 1-2	AHU-1, FLOORS 1 & 2 NORTHEAST	SINGLE DUCT VAV TERMINAL BOX	8	600	300	0.2	1	14.9	1.5	65	88.0	170	150	6	TRANE	VCWF	1,2,3,4,5,6,7
VAV 1-3	AHU-1, FLOORS 1 & 2 SOUTHEAST	SINGLE DUCT VAV TERMINAL BOX	10	800	400	0.2	2	23.6	2.4	65	92.3	170	150	2	TRANE	VCWF	1,2,3,4,5,6,7
VAV 1-4	AHU-1, FLOORS 1 & 2 SOUTH	SINGLE DUCT VAV TERMINAL BOX	14	2,050	1,030	0.2	1	31.7	3.2	65	79.3	170	150	4	TRANE	VCWF	1,2,3,4,5,6,7
VAV 1-5	AHU-1, FLOORS 1 & 2 WEST	SINGLE DUCT VAV TERMINAL BOX	14	1,850	930	0.2	1	48.0	4.8	65	89.0	170	150	6.5	TRANE	VCWF	1,2,3,4,5,6,7
VAV 2-1	AHU-2, FLOOR 3 INTERIOR	SINGLE DUCT VAV TERMINAL BOX	10	1,000	500	0.01	1	26.1	2.6	65	85.0	170	150	3.9	TRANE	VCWF	1,2,3,4,5,7
VAV 2-2	AHU-2, FLOOR 3 EAST	SINGLE DUCT VAV TERMINAL BOX	10	900	450	0.2	2	26.0	2.6	65	91.7	170	150	2	TRANE	VCWF	1,2,3,4,5,6,7
VAV 2-3	AHU-2, FLOOR 3 SOUTH	SINGLE DUCT VAV TERMINAL BOX	12	1,600	--	0.3	1	22.0	2.2	65	77.7	170	150	4	TRANE	VCWF	1,2,3,4,5,6,7
VAV 2-4	AHU-2, FLOOR 3 WEST	SINGLE DUCT VAV TERMINAL BOX	12	1,200	600	0.2	1	34.0	3.4	65	91.2	170	150	7	TRANE	VCWF	1,2,3,4,5,6,7

NOTES
1. PROVIDE WITH 3/8" CLOSED CELL INSULATION
2. CONTROLS ACTUATORS AND SENSORS BY MECHANICAL AND CONTROLS CONTRACTOR.
3. CONTRACTOR TO VERIFY "HAND" OF UNIT PRIOR TO ORDER.
4. REFER TO CONTROLS DRAWINGS FOR CONTROL POINTS AND EQUIPMENT.
5. PROVIDE UNIT-MOUNTED DISCONNECT.
6. REHEAT PROVIDED BY 100% HYDRONIC WATER.
7. BOXES SHALL BE SELECTED FOR MAX. NC OF 20

CONVECTOR SCHEDULE

TAG	SERVES	TYPE	HEATING: REQ. MBH	HOT WATER COIL: FLUID	EWT (°F)	LWT (°F)	FLOW (GPM)	WPD (FT OF H2O)	BASIS OF DESIGN: MFG	MODEL	DIMENSIONS (INCHES): L	D	H	NOTES
CONV-1	STAIR 2, FLOOR 1, LIB	RECESSED, WALL MOUNTED	8.47	WATER	170	150	0.85	0.2	STERLING	FWG-A	52	6	32	1,2,3,4,5,6,7,8,9
CONV-2	STAIR 6, FLOOR 1, EXHIBIT	RECESSED, WALL MOUNTED	8.40	30% PG	170	150	0.88	0.2	STERLING	FWG-A	52	6	32	1,2,3,4,5,6,7,8,9
CONV-3	STAIR 1, FLOOR 2, LIB	RECESSED, WALL MOUNTED	8.18	WATER	170	150	0.82	0.1	STERLING	FWG-A	44	8	32	1,2,3,4,5,6,7,8,9
CONV-4	STAIR 4, FLOOR 3, ARCHIVE	RECESSED, WALL MOUNTED	8.18	WATER	170	150	0.82	0.1	STERLING	FWG-A	44	8	32	1,2,3,4,5,6,7,8,9
CONV-5	STAIR 5, FLOOR 3, ARCHIVE	RECESSED, WALL MOUNTED	8.18	WATER	170	150	0.82	0.1	STERLING	FWG-A	44	8	32	1,2,3,4,5,6,7,8,9
CONV-6	STAIR 7, FLOOR 3, EXHIBIT	RECESSED, WALL MOUNTED	11.46	WATER	170	150	1.15	0.2	STERLING	FWG-A	60	8	32	1,2,3,4,5,6,7,8,9

NOTES:
1. STANDARD MFR CASING COLOR SELECTION TO BE APPROVED BY ARCHITECT.
2. UNIT SHALL HAVE A BOTTOM DISCHARGE.
3. PROVIDE INSULATION ON BACK OF CONVECTOR.
4. CABINET CASING: FRONT:18 GAUGE, SIDES AND BACK: 20 GAUGE.
5. HTG ELEMENT: 1/2" CU TUBE, 0.01" AL FINS.
6. UNIT SHALL HAVE OPPOSITE END CONNECTIONS.
7. UNIT SHALL HAVE LOUVERED AIR VENTS.
8. UNIT SHALL HAVE ACCESS DOORS, WITH ALLEN-KEY.
9. UNIT SHALL HAVE FACTORY APPLIED FINISH.

DUCT HEATING COIL SCHEDULE

TAG	SERVES	AIR FLOW: SUPPLY AIR (CFM)	OUTSIDE AIR: CFM	% OF SA	CAPACITY (TOTAL MBH)	AIR: ENTERING (DB °F)	LEAVING (DB °F)	VELOCITY (FPM)	APD (IN WC)	FLUID: FLUID	ENTERING (°F)	LEAVING (°F)	FLOW (GPM)	WPD (FT)	COIL: WIDTH (INCH)	HEIGHT (INCH)	AREA (SF)	ROWS	FIN SPACING (FPF)	VOLUME (GAL)	BASIS OF DESIGN: MFG	MODEL	WEIGHT (LB)	NOTES
HC-1	FOURTH FLOOR CONSERVATION LAB	4,000	4,000	100%	308	-3	68	706	0.30	30% PG	170	140	21.5	1.1	34	24	5.7	2	125	2.5	TRANE	D5WB24034	90	1
HC-2	FIRST FLOOR PAINT BOOTH	7,000	7,000	100%	539	-3	68	500	0.13	30% PG	170	140	37.7	3.9	84	24	14.0	2	86	4.5	TRANE	D5WB24084	160	1
HC-3	ERV-4	800	800	100%	31	50	85	640	0.17	30% PG	170	140	2.1	2.4	15	12	1.3	1	150	0.2	TRANE	DSTB12015	15	1
HC-4	FOURTH FLOOR EXHIBIT	2,925	0	0%	46	85	99	557	0.08	WATER	170	140	3.2	0.6	42	18	5.3	1	80	1.0	TRANE	D5WB18042	45	1

NOTES:
1. PROVIDE FLANGED CONNECTION FOR INSTALLATION INTO DUCTWORK

NOTES

1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES.

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STATE OF MAINE
STEVEN M. MARTEL
2/17/2022
7148
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CURRENT ISSUE STATUS:
PHASE 2 - ISSUED FOR BID
JANUARY 7, 2022

PROJECT:
STATE OF MAINE CULTURAL BUILDING
ASBESTOS ABATEMENT & MECHANICAL UPGRADES
Maine State Museum 230 State Street, Augusta ME 04333-0083

REV	REVISION ISSUE DESCRIPTION	DATE
C	ADDENDUM NO.3	02-17-2022
B	ADDENDUM NO. 2	02-08-2022
A	ISSUED FOR BID	01-07-2022

PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	SMM
DESIGNED BY:	SMM
DRAWN BY:	STR

SHEET TITLE:
MECHANICAL SCHEDULES

SHEET ID:
M-605

NOT FOR CONSTRUCTION

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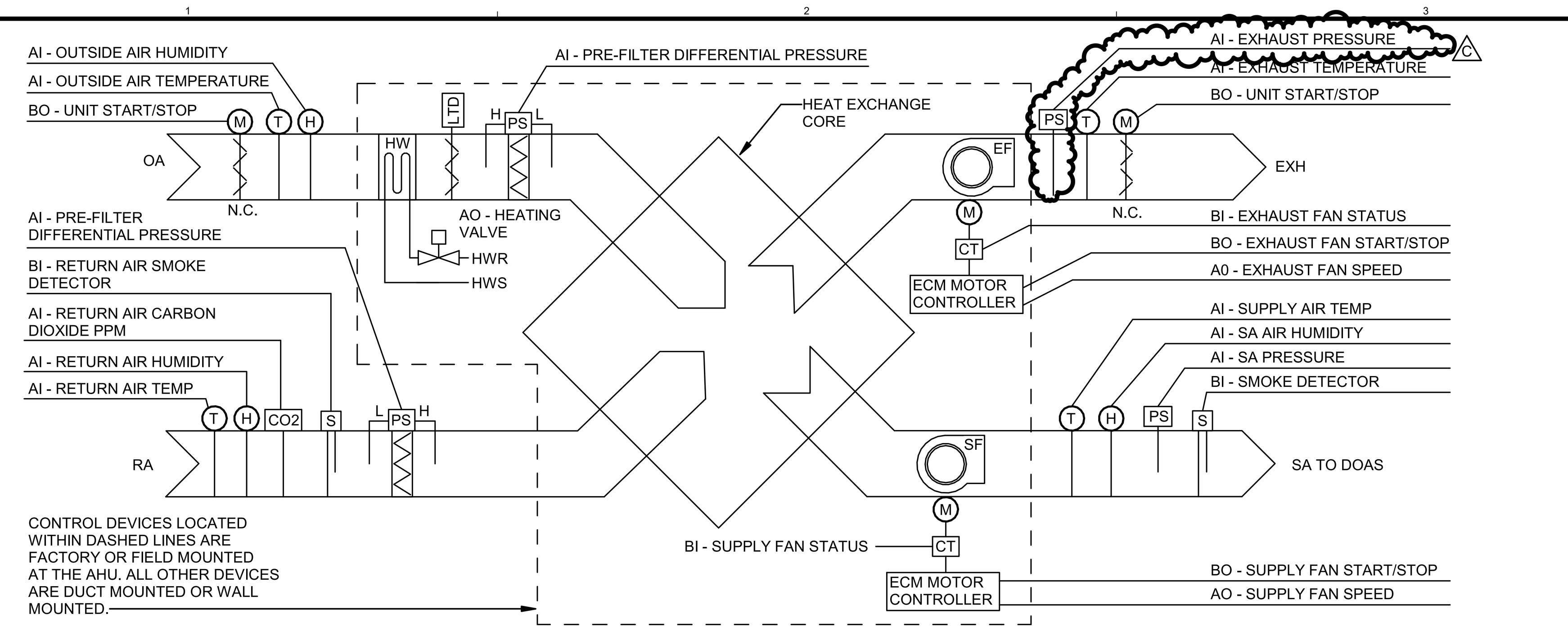
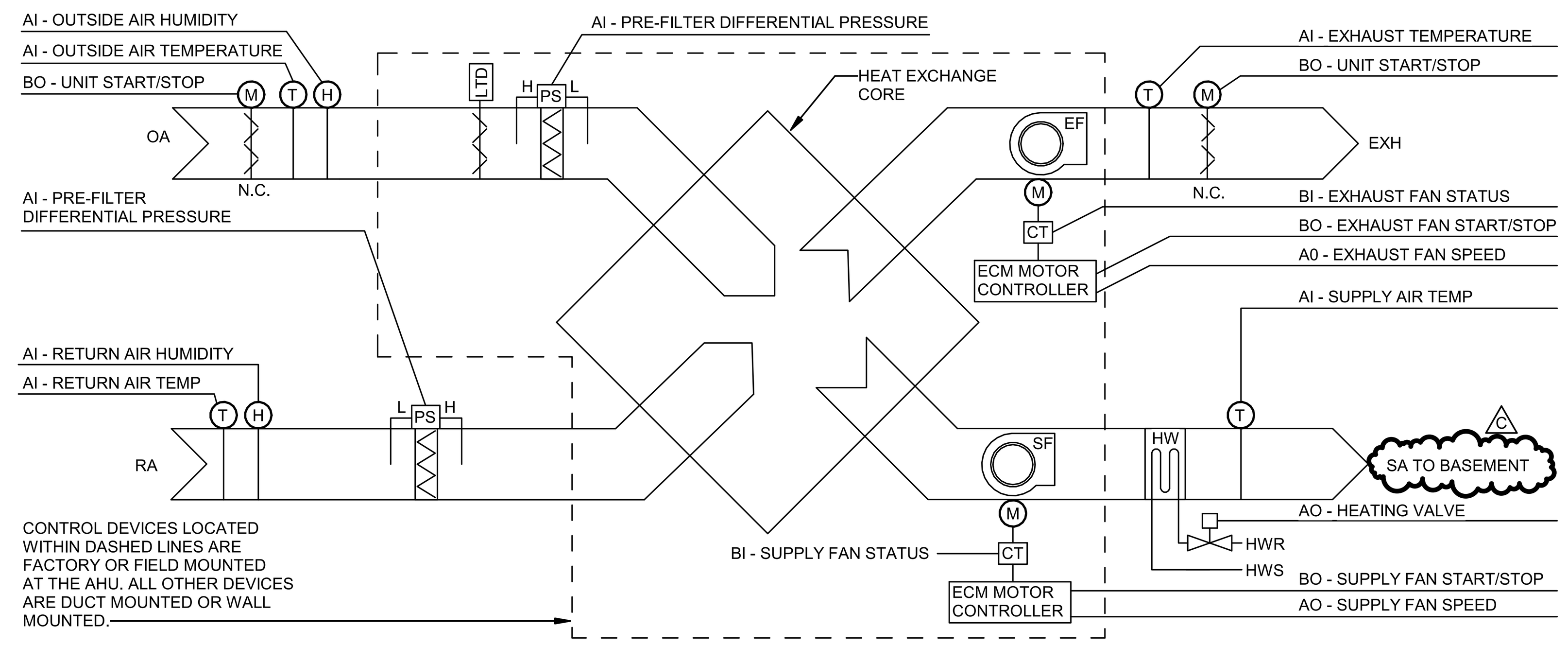
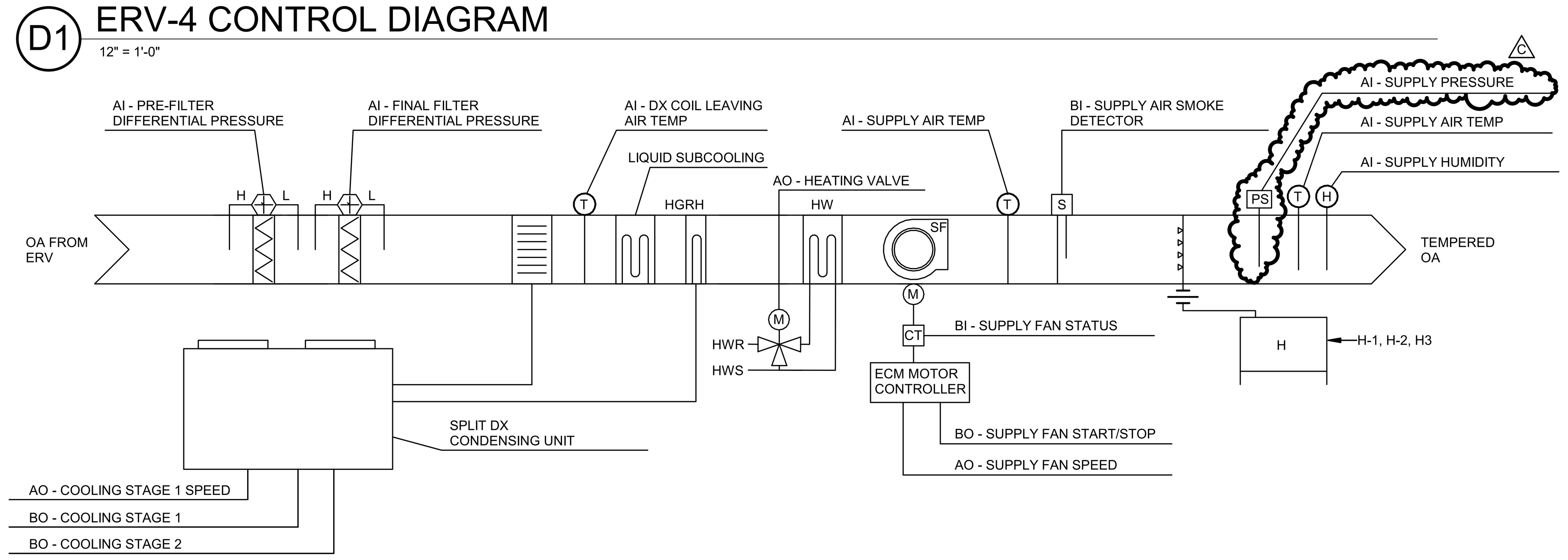


E1 ERV-1,2,3 CONTROL DIAGRAM
NOT TO SCALE



D1 ERV-4 CONTROL DIAGRAM
12" = 1'-0"



C1 DOAS CONTROL DIAGRAM
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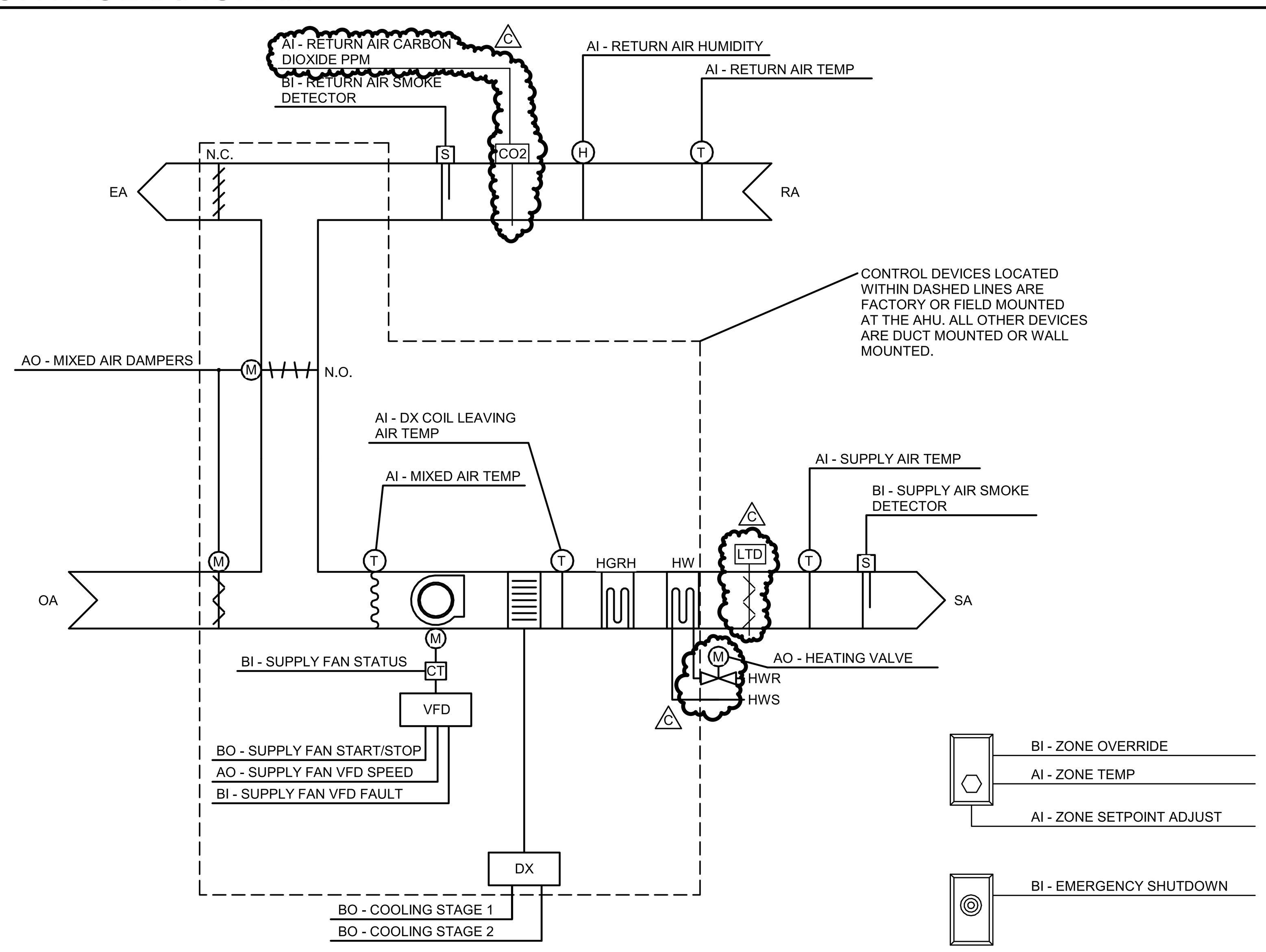

A1 AHU-4 CONTROL DIAGRAM
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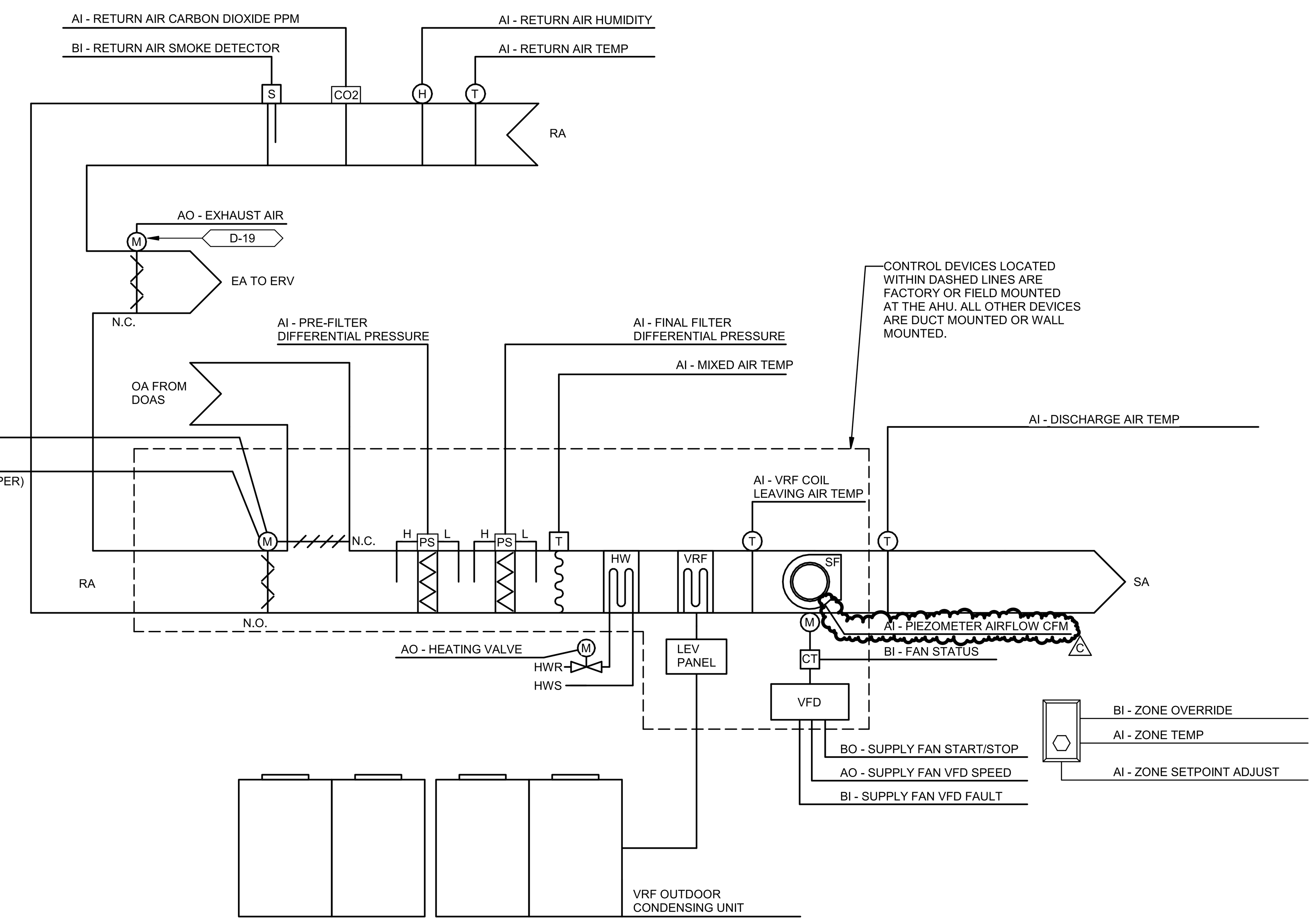
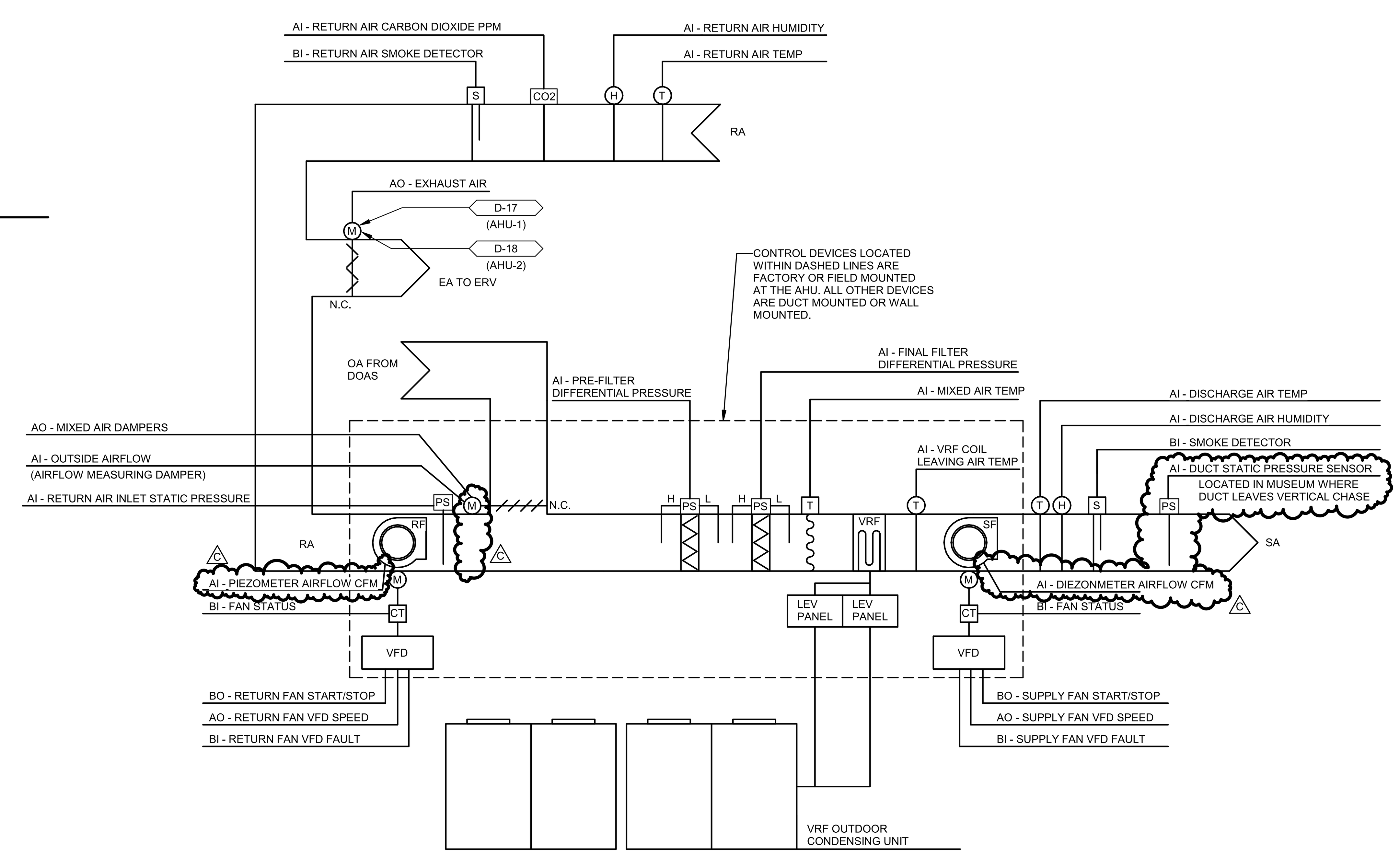


D4 AHU-3 CONTROL DIAGRAM
NOT TO SCALE



A4 AHU-1,2 CONTROL DIAGRAM
NOT TO SCALE

NOTES

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STATE OF MAINE — STEVEN M. MARTEL — 7148 — LICENSED — PROFESSIONAL ENGINEER

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Maine State Museum 230 State Street, Augusta ME 04333-0083

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PROJECT NO:	3618208720
PROJECT MANAGER:	KFM
A/E OF RECORD:	SMM
DESIGNED BY:	AF
DRAWN BY:	STR

SHEET TITLE:
CONTROL DIAGRAMS

SHEET ID:
M-706

NOT FOR CONSTRUCTION

SEQUENCE OF OPERATION

1.1 GENERAL

A. THE BUILDING AUTOMATION SYSTEM (BAS) SHALL CONTROL ALL THE HVAC SYSTEMS IN ACCORDANCE WITH THE DRAWINGS AND POINTS LISTS.

B. REFER TO SPECIFICATION 230923 FOR DESCRIPTION OF CONTROL SYSTEM INTEGRATION WITH THE STATE OF MAINE BUILDING CONTROL CENTER (BCC) WHICH USES THE HONEYWELL ENTERPRIZE BUILDING INTEGRATOR (EBI) SYSTEM.

C. THE INTENT IS TO PROVIDE ALL NEW BAS SYSTEM COMPONENTS IN THE MAINE CULTURAL BUILDING TO INCLUDE SENSORS, CONTROL WIRING, CONDUIT, CONTROLLERS, ACTUATORS, ETC.

D. THE GRAPHIC SCREENS SHALL BE UPDATED TO INCORPORATE GRAPHIC CONTROL AND MONITORING OF ALL HVAC EQUIPMENT FOR A COMPLETE CONTROL SYSTEM.

E. THE HVAC SYSTEMS SHALL BE AVAILABLE 24 HOURS PER DAY, 7 DAYS PER WEEK.

F. PUMPS SHALL BE PROVEN ON USING A CURRENT TRANSFORMER (CT) ON THE POWER SUPPLY TO THE PUMP FROM THE VFD. CT SETPOINT SHALL BE 10% LESS THAN THE CURRENT MEASURED AT MINIMUM PUMP SPEED.

G. FAIL SAFE POSITIONS ARE POSITIONS THAT DEVICES WILL GO TO WHEN DE-ENERGIZED: NO = NORMALLY OPEN, NC = NORMALLY CLOSED.

H. ALL LISTED SETPOINTS SHALL BE ADJUSTABLE AT THE BAS WORKSTATION WITHOUT PROGRAMMING.

I. ALL TEMPERATURES LISTED ARE IN DEGREES FARENHEIT (°F).

J. ADJUSTABLE (ADJ) MEANS THAT THE SETPOINT OR SCHEDULE CAN BE CHANGED USING THE BAS WORKSTATION GRAPHICS WITHOUT PROGRAMMING.

K. SUPPLY AND RETURN AIRFLOW SHALL BE MEASURED IN CFM USING PIEZOMETER TAPS AND TRANSDUCER PROVIDED BY AHU MANUFACTURER IN AHU SUPPLY AND RETURN FANS.

L. OUTSIDE AIRFLOW SHALL BE MEASURED IN CFM USING FLOW MEASURING DAMPERS PROVIDED IN AIR MIXING SECTION OF AHU-1, AHU-2, AHU-3.

1.2 SCHEDULES

A. PROVIDE AN ADJUSTABLE OCCUPANCY SCHEDULE IN THE GRAPHICS FOR EACH SYSTEM TO SWITCH HVAC EQUIPMENT BETWEEN OCCUPIED AND UNOCCUPIED MODES. SCHEDULES SHALL BE ADJUSTABLE WITHOUT PROGRAMMING USING THE BAS WORKSTATION.

1. OCCUPIED HOURS SHALL BE EASILY ADJUSTABLE AT THE BAS WORKSTATION. INITIAL SCHEDULE SHALL BE 7 DAYS A WEEK FROM 7 AM TO 5 PM, OR AS DIRECTED BY STATE OF MAINE PERSONNEL.

2. PROVIDE OPTIMUM START ALGORITHM TO SWITCH THE SYSTEM TO THE OCCUPIED SETPOINTS AT THE LATEST TIME POSSIBLE SO THAT SPACE TEMPERATURE REACHES THE OCCUPIED TEMPERATURE SETPOINT AT THE SCHEDULED OCCUPANCY TIME. VENTILATION SYSTEMS SHALL REMAIN OFF UNTIL THE SCHEDULED OCCUPIED HOURS.

3. PROVIDE THE CAPABILITY TO PROGRAM OR ADJUST OCCUPIED HOURS FOR SPECIAL EVENTS AT THE BAS WORKSTATION.

4. PROVIDE THE CAPABILITY TO PROGRAM OR ADJUST UNOCCUPIED HOURS FOR UP TO ONE YEAR FOR HOLIDAYS OR OTHER PERIODS WHEN THE BUILDING WILL BE CLOSED.

1.3 USER PERMISSIONS AND REMOTE ACCESS

A. PROVIDE MULTIPLE LEVELS OF USER ACCESS WITH THE FOLLOWING ACCESS LEVELS AS A MINIMUM:

1. FULL ACCESS: OPERATOR CAN ASSIGN USERNAMES, PASSWORDS, ADJUST ALL SETPOINTS AND SCHEDULES, AND OVERRIDE CONTROL POINTS.

2. NORMAL USER ACCESS: OPERATOR CAN ADJUST ALL SETPOINTS AND SCHEDULES.

3. LOW LEVEL ACCESS: OPERATOR CAN SEE THE GRAPHICS DISPLAY AND OBSERVE SYSTEM OPERATION BUT DOES NOT HAVE ACCESS TO MAKE ANY CHANGES.

B. PROVIDE THE CAPABILITY FOR AUTHORIZED USERS TO LOG IN TO THE BAS SYSTEM FROM A REMOTE COMPUTER USING THEIR USERNAME AND PASSWORD. REMOTE ACCESS SHALL SHOW THE GRAPHICS DISPLAY AND ALLOW MODIFICATIONS TO SETPOINTS AND SCHEDULED FOR USERS WITH NORMAL OR FULL ACCESS.

1.4 THERMOSTATS

A. THE OCCUPIED SPACE TEMPERATURE SETPOINT SHALL BE BASED ON THE DESIGN CONDITIONS SCHEDULE IN THE DRAWINGS. WHERE THE SPACE TEMPERATURE SETPOINT IS NOT OTHERWISE INDICATED, THE INITIAL SETPOINT SHALL BE 75°F COOLING (ADJUSTABLE). HEATING SETPOINT SHALL BE 5°F LOWER (ADJUSTABLE), FOR A 5°F DEADBAND.

B. OCCUPIED SETPOINT SHALL BE OCCUPANT ADJUSTABLE, EXCEPT WHERE NOTED OTHERWISE. LIMIT ADJUSTMENT TO A MINIMUM OF 70°F AND A MAXIMUM OF 76°F COOLING. OCCUPIED SETPOINT SHALL NOT BE OCCUPANT ADJUSTABLE IN THE LEVEL 1 AND 2 ARCHIVES SPACES.

C. UNOCCUPIED SETPOINT SHALL BE 62°F HEATING, 82°F COOLING (ADJUSTABLE AT THE BAS WORKSTATION). UNOCCUPIED SETPOINT SHALL BE THE SAME AS OCCUPIED SETPOINT IN THE LEVEL 1 AND 2 ARCHIVES SPACES.

D. OVERRIDE BUTTON ON THE THERMOSTAT SHALL OVERRIDE THE SYSTEM TO OCCUPIED MODE FOR 2 HOURS (ADJUSTABLE).

1.5 VARIABLE REFRIGERANT FLOW (VRF) SYSTEMS

A. GENERAL

1. EACH VARIABLE REFRIGERANT FLOW SYSTEM AND ITS VARIOUS COMPONENTS (FAN COILS, BRANCH CIRCUIT CONTROLLERS, LEV KITS, AND CONDENSING UNITS) SHALL BE CONTROLLED BY THE VRF SYSTEM VENDOR'S CONTROL SYSTEM USING ITS OWN INTERNAL SAFETIES AND CONTROL SEQUENCES TO MAINTAIN SPACE TEMPERATURE SETPOINT.

2. VRF CONTROLLERS SHALL COMMUNICATE WITH THE BAS OVER BACNET TO MONITOR EQUIPMENT STATUS AND ADJUST SETPOINTS FROM THE BAS WORKSTATION.

3. SPACE TEMPERATURE AND SPACE TEMPERATURE SETPOINT SHALL BE INTEGRATED INTO THE BAS GRAPHICS. SETPOINT ADJUSTMENT SHALL BE AVAILABLE TO USER LEVEL 2 OR HIGHER AT THE BAS WORKSTATION.

B. VRF OUTDOOR UNITS INSTALLED INDOORS

1. WHERE VRF OUTDOOR UNITS ARE INSTALLED IN MECHANICAL ROOMS, EACH OUTDOOR UNIT SHALL HAVE ONE OR MORE OUTSIDE AIR DAMPERS, EXHAUST AIR DAMPERS, AND RETURN AIR DAMPERS.

2. WHEN OUTDOOR AIR TEMPERATURE IS AT OR ABOVE THE MECHANICAL ROOM TEMPERATURE SETPOINT (MRTS) (INITIALLY 40 DEG F +/- 5 DEG F, ADJUSTABLE), THE OUTSIDE AIR DAMPERS AND EXHAUST AIR DAMPERS SHALL BE OPEN WHILE THE RETURN AIR DAMPERS ARE CLOSED.

3. WHEN OUTDOOR AIR TEMPERATURE IS BELOW THE MECHANICAL ROOM TEMPERATURE SETPOINT, THE OUTDOOR AIR DAMPERS AND EXHAUST AIR DAMPERS SHALL BE CLOSED AND THE RETURN AIR DAMPERS SHALL OPEN. THE UNIT HEATERS SHALL OPERATE TO MAINTAIN SPACE TEMPERATURE AT THE MECHANICAL ROOM TEMPERATURE SETPOINT.

4. REFRIGERANT MONITORING: PROVIDE AND INSTALL A REFRIGERANT MONITORING DEVICE TO DETECT R-410a LOCATED WITHIN 12 INCHES ABOVE THE LOWEST FLOOR LEVEL IN EACH OF THE THREE MECHANICAL ROOMS: 315, 348, 416.

a. IF DETECTED REFRIGERANT CONCENTRATION RISES ABOVE 50 PPM (ADJUSTABLE), OVERRIDE THE OUTSIDE AIR AND EXHAUST AIR DAMPERS OPEN TO DILUTE REFRIGERANT, ACTIVATE ALARM BELL AND WARNING LIGHT LOCATED JUST ABOVE THE ROOM ACCESS DOORS, AND GENERATE A CRITICAL ALARM AT THE BAS WORKSTATION.

b. WHEN REFRIGERANT CONCENTRATION DROPS BELOW 10 PPM FOR 5 MINUTES (ADJUSTABLE), SILENCE THE ALARM AND ALLOW OUTSIDE AIR AND EXHAUST AIR DAMPERS TO CLOSE IF OUTSIDE AIR TEMPERATURE IS BELOW THE MECHANICAL ROOM TEMPERATURE SETPOINT.

1.6 VENTILATION SYSTEMS

A. SCHEDULE

1. VENTILATION SYSTEMS SHALL BE SET TO OCCUPIED MODE WHENEVER ANY OF THE SERVED VRF AND AHU SYSTEMS ARE IN OCCUPIED MODE.

2. VENTILATION SYSTEMS SHALL DEFAULT TO UNOCCUPIED MODE WHENEVER ALL OF THE SERVED VRF AND AHU SYSTEMS ARE IN UNOCCUPIED MODE.

B. ENERGY RECOVERY VENTILATOR (ERV): ERV-1, ERV-2, ERV-3

1. OCCUPIED MODE

a. THE OUTSIDE AIR DAMPER AND EXHAUST AIR DAMPER SHALL OPEN AND THE ERV SUPPLY AND EXHAUST FANS SHALL START AT LOW SPEED, THEN RAMP UP TO NORMAL FAN SPEED NEEDED TO SUPPLY SCHEDULED OUTSIDE AIR (SAME AIRFLOW AS THE ASSOCIATED DOAS UNIT) AND EXHAUST AIR, AS MEASURED AND SET BY THE TAB CONTRACTOR.

b. THE ERV FANS SHALL RUN CONTINUOUSLY TO SUPPLY MINIMUM OUTSIDE AIR TO THE ASSOCIATED DOAS UNITS.

c. THE ERV 30% PROPYLENE GLYCOL / HOT WATER PRE-HEAT COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN ENTERING AIR TEMPERATURE (EAT) TO THE HEAT EXCHANGER CORE OF 20 DEG F (ADJUSTABLE).

d. WHEN OUTSIDE AIR IS COLDER THAN 10 DEG F, THE HEATING COIL CONTROL VALVE MINIMUM POSITION SHALL BE 10% OPEN (ADJUSTABLE).

2. UNOCCUPIED MODE

a. ERV FANS SHALL BE OFF AND THE OUTSIDE AIR DAMPER AND EXHAUST AIR DAMPER SHALL BE CLOSED. THE HEATING COIL CONTROL VALVE SHALL CLOSE.

b. WHEN OUTSIDE AIR IS COLDER THAN 20 DEG F, THE HEATING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN DUCT TEMPERATURE DOWNSTREAM OF THE HEATING COIL AT THE HX CORE EAT SETPOINT (20 DEG F).

3. ALARMS

A. LOW ENTERING AIR TEMPERATURE

1) IF ENTERING AIR TEMP TO THE HEAT EXCHANGER CORE DROPS BELOW 15 DEG F (ADJ) FOR 10 MINUTES (ADJ), GENERATE AN ALARM.

2) IF ENTERING AIR TEMP TO THE HEAT EXCHANGER CORE DROPS BELOW 15 DEG F (ADJ) FOR 30 MINUTES (ADJ), SHUT DOWN THE ERV, THE ASSOCIATED DOAS, AND CLOSE OUTSIDE AIR AND EXHAUST DAMPERS.

B. DIRTY FILTERS

1) PROVIDE FILTER DIFFERENTIAL PRESSURE (DP) SENSOR FOR ERV OUTSIDE AIR AND RETURN AIR FILTERS. STATUS OF FILTER DP SENSORS SHALL BE INDICATED ON THE GRAPHICS ON THE BAS WORKSTATION.

2) WHEN PRESSURE DROP ACROSS THE FILTER EXCEEDS 1.0 IN WC (ADJUSTABLE) INDICATING FILTERS NEED TO BE CHANGED, GENERATE ALARM ON THE BAS WORKSTATION.

C. WIRE DUCT SMOKE DETECTORS TO SHUT OFF THE ERV FANS, CLOSE ITS OUTSIDE AIR AND EXHAUST DAMPERS, SET THE ASSOCIATED DOAS TO UNOCCUPIED MODE, AND GENERATE AN ALARM ON THE BAS AND FIRE ALARM SYSTEM IF SMOKE IS DETECTED IN THE SUPPLY AIR OR RETURN AIR.

D. HIGH STATIC PRESSURE

1) WHEN SUPPLY OR EXHAUST FAN PRESSURE SENSOR DETECTS PRESSURE HIGHER THAN 1 INCH WC (ADJUSTABLE), SHUT DOWN ERV AND ASSOCIATED DOAS AND GENERATE AN ALARM ON THE BAS WORKSTATION.

C. ENERGY RECOVERY VENTILATOR: ERV-4

1. OCCUPIED MODE

a. THE OUTSIDE AIR DAMPER AND EXHAUST AIR DAMPER SHALL OPEN AND THE ERV-4 FANS SHALL START AT LOW SPEED, RAMP UP TO SPEED SET BY BALANCER, THEN RUN CONTINUOUSLY TO SUPPLY OUTSIDE AIR AND EXHAUST TO THE BASEMENT SPACES SERVED.

b. HEATING COIL HC-3 CONTROL VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE AT SETPOINT.

2. UNOCCUPIED MODE

a. ERV-4 FANS SHALL BE OFF AND THE OUTSIDE AIR DAMPER AND EXHAUST AIR DAMPER SHALL BE CLOSED. HC-3 CONTROL VALVE SHALL CLOSE.

b. IF SPACE TEMPERATURE RISES OR FALLS MORE THAN 10 DEG F FROM SETPOINT, ERV-4 SHALL RUN IN OCCUPIED MODE AND HC-3 SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE AT SETPOINT ±5 DEG F.

3. ALARMS

a. FREEZE PROTECTION

1) IF THE DISCHARGE AIR TEMPERATURE IS BELOW 40 DEG F (ADJ) FOR MORE THAN 5 MINUTES, GENERATE ALARM, SHUT DOWN ERV-4 FANS AND CLOSE THE ASSOCIATED OUTSIDE AIR AND EXHAUST AIR DAMPERS.

b. HIGH DISCHARGE AIR TEMPERATURE

1) IF THE DISCHARGE AIR TEMPERATURE IS ABOVE 100 DEG F (ADJ) FOR MORE THAN 5 MINUTES, GENERATE ALARM.

D. DEDICATED OUTSIDE AIR SYSTEM (DOAS): DOAS-1, DOAS-2, DOAS-3

1. OCCUPIED MODE

a. EACH DOAS UNIT SHALL START AND RUN CONTINUOUSLY WHENEVER ITS ASSOCIATED ERV RUNS.

b. THE DOAS SUPPLY FAN SHALL START AT LOW SPEED THEN RAMP UP TO FAN SPEED REQUIRED TO PROVIDE THE SCHEDULED OUTSIDE AIRFLOW AS DETERMINED DURING BALANCING. THE DOAS FANS SHALL RUN CONTINUOUSLY TO SUPPLY MINIMUM OUTSIDE AIR TO AHU-1, AHU-2, AND AHU-3.

c. THE DOAS SHALL BE CONTROLLED BY ITS OWN INTEGRAL CONTROLLER SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROL SEQUENCES TO MAINTAIN A CONSTANT LEAVING AIR TEMPERATURE (LAT) OF 70 DEG F (ADJ).

d. DEHUMIDIFICATION: THE DOAS CONTROLLER SHALL SEQUENCE TWO STAGES OF COOLING, MODULATE THE FIRST STAGE OF COOLING, PROVIDE LIQUID SUBCOOLING REHEAT, AND MODULATE HOT GAS REHEAT TO MAINTAIN LEAVING AIR TEMPERATURE OF 70 DEG F (ADJ) AT A DEWPOINT OF 51 DEG F.

e. HEATING: THE DOAS HEATING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN LEAVING AIR TEMPERATURE 2 DEG F LOWER THAN THE LAT SETPOINT (ADJUSTABLE). THE HEATING COIL SHALL BE LOCKED OUT WHEN EVER THE DX SYSTEM IS RUNNING.

f. HUMIDIFICATION: ELECTRIC HUMIDIFIER ASSOCIATED WITH EACH DOAS UNIT SHALL START AND MODULATE STEAM OUTPUT TO MAINTAIN SUPPLY AIR FROM DOAS UNIT AT 40% RELATIVE HUMIDITY (RH) (ADJUSTABLE). THE HUMIDIFIER SHALL BE LOCKED OUT WHENEVER THE DX COOLING SYSTEM IS RUNNING OR THE ASSOCIATED DOAS IS OFF.

2. UNOCCUPIED MODE

a. DOAS SUPPLY FAN, COMPRESSORS, CONDENSER FANS SHALL TURN OFF, THE HEATING COIL CONTROL VALVE SHALL CLOSE AND THE ASSOCIATED HUMIDIFIER SHALL BE OFF.

3. ALARMS

a. LOW ENTERING AIR TEMPERATURE

1) IF ENTERING AIR TEMP DROPS BELOW 40 DEG F (ADJ) FOR 10 MINUTES (ADJ), GENERATE ALARM AT THE BAS WORKSTATION.

b. HIGH LEAVING AIR TEMPERATURE

1) IF LEAVING AIR TEMPERATURE IS ABOVE 75 DEG F (ADJ) FOR 10 MINUTES (ADJ), GENERATE ALARM AT THE BAS WORKSTATION.

c. LOW LEAVING AIR TEMPERATURE

1) IF LEAVING AIR TEMPERATURE IS BELOW 60 DEG F (ADJ) FOR 10 MINUTES (ADJ), GENERATE ALARM AT THE BAS WORKSTATION.

d. LOW LEAVING AIR HUMIDITY

1) IF LEAVING AIR RELATIVE HUMIDITY IS LESS THAN 30% AT 72 DEG F (ADJUSTABLE) FOR 10 MINUTES (ADJUSTABLE), GENERATE ALARM AT THE BAS WORKSTATION.

e. HIGH LEAVING AIR HUMIDITY

1) COOLING MODE: IF LEAVING AIR CALCULATED DEWPOINT EXCEEDS 55 DEG F (ADJUSTABLE) FOR 10 MINUTES (ADJUSTABLE), GENERATE ALARM AT THE BAS WORKSTATION.

2) HEATING MODE: IF LEAVING AIR HUMIDITY EXCEEDS 50% RH AT 72 DEG F (ADJUSTABLE) FOR 10 MINUTES (ADJUSTABLE) SHUT OFF HUMIDIFIER AND GENERATE ALARM AT THE BAS WORKSTATION.

f. FILTER MONITORING

1) PROVIDE PRE-FILTER AND FINAL FILTER DIFFERENTIAL PRESSURE SENSORS. FILTER DIFFERENTIAL PRESSURES SHALL BE DISPLAYED AT THE BAS WORKSTATION.

2) GENERATE AN ALARM AT THE BAS WORKSTATION IF FILTER DP EXCEEDS 1.0 INCH WC (ADJUSTABLE) .

g. CONDENSATE OVERFLOW SWITCH

1) PROVIDE CONDENSATE OVERFLOW SWITCH OPTION WITH DOAS. RELAY STATUS OF CONDENSATE OVERFLOW SWITCH TO BAS WORKSTATION.

2) WHEN CONDENSATE OVERFLOW SWITCH TRIPS, GENERATE ALARM AT THE BAS WORKSTATION.

1.7 AIR HANDLING UNITS AHU-1 AND AHU-2

A. AHU-1 AND AHU-2 ARE VAV AIR HANDLING UNITS WITH A VRF COOLING COIL THAT SERVE MULTIPLE VAV TERMINAL UNITS WITH HEATING COILS.

B. OCCUPIED MODE

1. THE SUPPLY FAN AND RETURN FAN SHALL START AT LOW SPEED AND THEN RAMP UP TO NORMAL OPERATING SPEED AS FOLLOWS:

a. SUPPLY FAN SPEED SHALL MODULATE TO MAINTAIN SUPPLY DUCT STATIC PRESSURE AT SETPOINT. FAN PIEZOMETER AND TRANSDUCER PROVIDED WITH AHU SHALL BE USED TO MEASURE SA CFM.

b. RETURN FAN SPEED SHALL MODULATE TO MAINTAIN RA AIRFLOW AT THE AHU INLET PER THE FOLLOWING EQUATION:

RA CFM = SA CFM – OA CFM

FAN PIEZOMETER AND TRANSDUCER PROVIDED WITH AHU SHALL BE USED TO MEASURE RA CFM.

c. AHU GRAPHIC SHALL DISPLAY THE FOLLOWING OPERATING POINTS:

1) SA CFM

2) RA CFM

3) OA CFM

4) STATIC PRESSURE AT THE MIXING BOX.

2. SUPPLY AIR STATIC PRESSURE RESET CONTROL

a. SUPPLY FAN MAXIMUM SPEED IS CONTROLLED TO MAINTAIN DUCT STATIC PRESSURE AT THE SETPOINT DETERMINED DURING BALANCING.

b. POLL THE STATUS OF THE ASSOCIATED VAV BOX DAMPERS. IF ALL VAV DAMPERS ARE LESS THAN 75% OPEN (ADJUSTABLE), FAN STATIC SETPOINT SHALL BE REDUCED 0.25 INCH WC (ADJUSTABLE). AFTER 10 MINUTES (ADJUSTABLE) REPEAT THIS PROCESS UNTIL AT LEAST ONE VAV BOX DAMPER IS 80% OPEN (ADJUSTABLE) OR MORE.

3. VENTILATION CONTROL

a. THE MIXING BOX MEASURING OUTSIDE AIR DAMPERS (TRAQ) SHALL MODULATE TO MAINTAIN OUTSIDE AIR FLOW FROM DOAS-03 AT THE UNIT SCHEDULED OUTSIDE AIR CFM SETPOINT.

b. THE GENERAL EXHAUST DAMPER FROM THE RA SHALL BE OPENED.

4. SUPPLY AIR TEMPERATURE CONTROL

a. DURING OCCUPIED MODE, THE VRF COOLING COIL AND THE ASSOCIATED CONDENSING UNIT SHALL MODULATE TO MAINTAIN DISCHARGE AIR TEMPERATURE AT THE RESET SETPOINT.

5. SUPPLY AIR TEMPERATURE RESET

a. SUPPLY AIR TEMPERATURE SETPOINT SHALL INITIALLY BE SET TO 55 DEG F (ADJUSTABLE).

b. SUPPLY AIR TEMPERATURE SETPOINT SHALL BE RESET FROM 55 DEG F UP TO A MAXIMUM OF 65 DEG F (ADJUSTABLE) AS RETURN AIR TEMPERATURE VARIES FROM 75 DEG F (ADJUSTABLE) TO 70 DEG F (ADJUSTABLE) AS NEEDED TO MAINTAIN SPACE TEMPERATURE IN ALL SERVED VAV ZONES AT SETPOINT WITHOUT REHEAT.

C. UNOCCUPIED MODE

1. THE SUPPLY FAN AND THE RETURN FAN SHALL BE OFF, THE MIXING BOX OUTSIDE AIR DAMPER AND THE GENERAL EXHAUST DAMPER FROM THE RA SHALL BE CLOSED.

2. IF ANY ASSOCIATED VAV ZONE DROPS BELOW ITS UNOCCUPIED HEATING TEMPERATURE SETPOINT, OR RISES ABOVE ITS UNOCCUPIED COOLING TEMPERATURE SETPOINT, THE SUPPLY AIR FAN SHALL START AND RAMP UP TO 75% SPEED (ADJUSTABLE). THE RETURN AIR FAN SHALL MODULATE TO MAINTAIN RA AIRFLOW AT THE AHU INLET PER THE FOLLOWING EQUATION:

RA CFM = SA CFM.

THE OUTSIDE AIR DAMPERS AND THE EXHAUST AIR DAMPERS SHALL REMAIN CLOSED.

a. THE ASSOCIATED VAV BOX DAMPERS AND HEATING COILS SHALL MODULATE ACCORDING TO THE VAV BOX CONTROL SEQUENCE TO COOL OR HEAT ALL SERVED SPACES TO THEIR UNOCCUPIED TEMPERATURE SETPOINT.

b. IF ALL SERVED SPACES ARE NOT AT THE UNOCCUPIED TEMPERATURE SETPOINT AFTER 20 MINUTES (ADJUSTABLE), THE SUPPLY FAN SPEED SHALL BE INCREASED TO MAXIMUM (AS SET DURING BALANCING), THE RETURN FAN SHALL MODULATE TO MAINTAIN

RA CFM = SA CFM

THE OUTSIDE AIR DAMPERS AND EXHAUST AIR DAMPERS SHALL REMAIN CLOSED.

c. WHEN ALL SPACES ARE WITHIN THEIR UNOCCUPIED TEMPERATURE SETPOINTS, THE SUPPLY AIR FAN AND RETURN AIR FAN SHALL STOP AND NORMAL UNOCCUPIED MODE SHALL RESUME.

3. UNOCCUPIED OVERRIDE

a. WHEN THE UNOCCUPIED OVERRIDE BUTTON ON ANY OF THE VAV BOX THERMOSTATS IS PRESSED FOR ONE SECOND OR MORE, AHU-1, AHU-2, AHU-3, AND DOAS-3 SHALL START AND RUN IN OCCUPIED MODE FOR 2 HOURS (ADJUSTABLE), THEN SWITCH BACK TO UNOCCUPIED MODE. PRESSING ANY OF THE OVERRIDE BUTTONS WHILE THE SYSTEM IS RUNNING IN OVERRIDE MODE SHALL RESET THE OCCUPIED MODE RUN TIME.

D. ALARMS

1. FAN STATUS-COMMAND

a. IF THE FAN STATUS DIFFERS FROM THE COMMAND FOR 15 SECONDS, GENERATE ALARM AT THE BAS WORKSTATION.

2. DIRTY FILTERS

a. IF THE DIFFERENTIAL PRESSURE SENSOR ACROSS THE PRE-FILTERS EXCEEDS 0.75 INCH (ADJUSTABLE) FOR 5 MINUTES WHEN AIRFLOW EXCEEDS 80%, GENERATE ALARM AT THE BAS WORKSTATION.

b. IF THE DIFFERENTIAL PRESSURE SENSOR ACROSS THE FINAL FILTERS EXCEEDS 1.0 IN WC (ADJUSTABLE) FOR 5 MINUTES WHEN AIRFLOW EXCEEDS 80%, GENERATE ALARM AT THE BAS WORKSTATION.

3. WIRE DUCT SMOKE DETECTORS TO SHUT DOWN THE ASSOCIATED AHU SUPPLY AND RETURN FANS AND DOAS-3 AND GENERATE AN ALARM ON THE BAS AND FIRE ALARM SYSTEM IF SMOKE IS DETECTED IN THE SUPPLY AIR OR RETURN AIR.

4. AUTOMATIC FAULT DETECTION AND DIAGNOSTICS (AFDD)

a. AFDD CONDITIONS ARE EVALUATED CONTINUOUSLY AND SEPARATELY FOR EACH OPERATING AHU.

b. THE FOLLOWING VALUES SHALL BE CONTINUOUSLY CALCULATED BY THE AFDD ROUTINES FOR EACH AHU:

1) FIVE MINUTE ROLLING AVERAGES WITH 1-MINUTE SAMPLING TIME OF THE FOLLOWING POINT VALUES; OPERATOR SHALL HAVE THE ABILITY TO ADJUST THE AVERAGING WINDOW AND SAMPLING PERIOD OF EACH POINT INDEPENDENTLY

a) SUPPLY AIR TEMPERATURE

b) MIXED AIR TEMPERATURE

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c) RETURN AIR TEMPERATURE

d) OUTDOOR AIR TEMPERATURE

e) DUCT STATIC PRESSURE

f) COOLING COIL LEAVING AIR TEMPERATURE

c. THE INTERNAL AFDD VARIABLES SHOWN BELOW SHALL BE DEFINED FOR EACH AHU. ALL PARAMETERS ARE ADJUSTABLE BY THE OPERATOR WITH INITIAL VALUES AS FOLLOWS:

1) TEMP RISE ACROSS SUPPLY FAN = 2 DEG F

2) TEMP ERROR THRESHOLD FOR SUPPLY, RETURN, AND OUTSIDE AIR TEMP SENSOR = 2 DEG F

3) TEMP ERROR THRESHOLD FOR MIXED AIR TEMP SENSOR = 5 DEG F

4) AIRFLOW ERROR THRESHOLD = 20%

5) VFD SPEED ERROR THRESHOLD = 5%

6) DUCT STATIC PRESSURE ERROR THRESHOLD = 0.10"

7) COOLING COIL ENTERING/LEAVING TEMP SENSOR ERROR = 2 DEG F

8) TIME IN MINUTES THAT A FAULT MUST PERSIST BEFORE TRIGGERING AN ALARM = 30 MIN.

d. THE FOLLOWING FAULT CONDITIONS SHALL BE ANALYZED

1) DUCT STATIC PRESSURE TOO LOW WITH FAN AT FULL SPEED

2) MIXED AIR TEMP TOO LOW OR TOO HIGH; SHOULD BE BETWEEN RA TEMP AND DOAS OA SUPPLY TEMP

3) SUPPLY AIR TEMP TOO HIGH; SHOULD BE LESS THAN OR EQUAL TO MIXED AIR TEMP + 2 DEG F FAN HEAT.

4) SUPPLY AIR TEMP TOO HIGH IN FULL COOLING.

e. EVALUATION OF FAULT CONDITIONS SHALL BE SUSPENDED WHEN AHU IS NOT RUNNING OR FOR 30 MINUTES AFTER A CHANGE IN OPERATING MODE (I.E. UNOCCUPIED TO OCCUPIED MODE)

1.8 VAV TERMINAL UNITS WITH HEAT

A. REFER TO VAV BOX SCHEDULE FOR MINIMUM AND MAXIMUM AIRFLOW SETPOINTS.

B. IN COOLING MODE, THE VAV TERMINAL UNIT DAMPER SHALL MODULATE FROM MINIMUM TO MAXIMUM AIRFLOW TO MAINTAIN SPACE TEMPERATURE AT SETPOINT.

C. IN HEATING MODE, UPON A CONTINUED DROP IN SPACE TEMPERATURE WHILE THE DAMPER IS AT MINIMUM POSITION, THE HEATING COIL SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE SETPOINT WHILE MAINTAINING A MAXIMUM LEAVING AIR TEMPERATURE OF 90 DEG F (ADJUSTABLE). HEATING MODE SHALL BE LOCKED OUT WHEN COOLING COIL IS RUNNING.

D. UPON A CONTINUED DROP IN SPACE TEMPERATURE, THE VAV BOX DAMPER SHALL MODULATE UP TO THE MAXIMUM AIRFLOW SETPOINT WHILE MAINTAINING 90 DEG F DISCHARGE AIR TEMPERATURE.

E. THE VAV DAMPER SHALL BE MODULATED BY A PID CONTROL LOOP TO MAINTAIN THE MEASURED AIRFLOW AT THE ACTIVE AIRFLOW SETPOINT.

F. ALARMS

1. LOW AIRFLOW

a. IF MEASURED AIRFLOW IS LESS THAN 80% OF SETPOINT FOR 10 MINUTES (ADJUSTABLE) WHILE SETPOINT IS GREATER THAN ZERO, GENERATE ALARM.

2. LOW DISCHARGE AIR TEMPERATURE

a. IF HEATING HOT WATER IS PROVEN ON AND DISCHARGE AIR TEMPERATURE IS 15 DEG (ADJ) LESS THAN SETPOINT FOR 10 MINUTES, GENERATE ALARM.

3. AIRFLOW SENSOR CALIBRATION

a. IF THE FAN SERVING THE ZONE IS OFF AND AIRFLOW SENSOR READING IS ABOVE THE LARGER OF 10% OF THE COOLING MAXIMUM AIRFLOW SETPOINT OR 50 CFM FOR 30 MINUTES, GENERATE ALARM.

4. LEAKING VALVE

a. IF THE VALVE POSITION IS 0% FOR 15 MINUTES, DISCHARGE AIR TEMP IS 5 DEG F OR MORE ABOVE AHU SUPPLY TEMP AND THE FAN SERVING THE ZONE IS PROVEN ON, GENERATE ALARM.

1.9 AIR HANDLING UNIT AHU-3

A. AHU-3 IS A SINGLE ZONE VAV AIR HANDLING UNIT WITH A 30% PROPYLENE GLYCOL HEATING COIL AND A VRF COOLING COIL.

B. OCCUPIED MODE

1. THE SUPPLY FAN SHALL RUN CONTINUOUSLY WHENEVER THE UNIT IS IN OCCUPIED MODE.

2. SUPPLY FAN SPEED CONTROL SETTINGS

a. PROVIDE RAMP FUNCTION TO PREVENT CHANGES IN FAN SPEED OF MORE THAN 10% PER MINUTE

b. MAXIMUM FAN SPEED SHALL BE THE SCHEDULED SUPPLY AIRFLOW.

c. MINIMUM FAN SPEED SHALL BE 40% OF MAXIMUM SPEED (ADJUSTABLE).

3. SUPPLY AIR TEMPERATURE AND SUPPLY FAN SPEED CONTROL

a. PROVIDE RAMP FUNCTION TO PREVENT CHANGES IN SUPPLY AIR TEMPERATURE OF MORE THAN 0.5 DEG PER MINUTE.

b. AT MAX COOLING, FAN SPEED SHALL BE AT MAXIMUM AND VRF COOLING COIL SHALL MODULATE TO MAINTAIN DISCHARGE AIR TEMPERATURE OF 55 DEG F (ADJ).

c. UPON A DROP IN SPACE TEMPERATURE, FAN SPEED SHALL RAMP DOWN TOWARD MINIMUM FLOW.

d. UPON A CONTINUED DROP IN SPACE TEMPERATURE AFTER FAN IS AT MINIMUM FLOW, SUPPLY AIR TEMPERATURE SHALL BE RESET FROM A MINIMUM DISCHARGE AIR TEMPERATURE OF 55 DEG F (ADJ) UP TO A MAXIMUM OF 65 DEG F (ADJ).

e. UPON A CONTINUED DROP IN SPACE TEMPERATURE, FAN SHALL CONTINUE AT MINIMUM SPEED AND VRF COOLING COIL SHALL MODULATE OFF.

f. UPON A CONTINUED DROP IN SPACE TEMPERATURE BELOW HEATING SETPOINT, THE HEATING COIL CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN DISCHARGE AIR TEMPERATURE OF 75 DEG F (ADJ).

g. UPON A CONTINUED DROP IN SPACE TEMPERATURE AFTER FAN IS AT MINIMUM FLOW, SUPPLY AIR TEMPERATURE SHALL BE RESET FROM A MINIMUM DISCHARGE AIR TEMPERATURE OF 75 DEG F (ADJ) UP TO A MAXIMUM OF 90 DEG F (ADJ).

h. UPON A CONTINUED DROP IN SPACE TEMPERATURE AFTER DISCHARGE AIR TEMPERATURE IS AT MAXIMUM OF 90 DEG F (ADJ), THE FAN SPEED SHALL MODULATE TO MAXIMUM AIRFLOW AS NEEDED TO MAINTAIN SPACE TEMPERATURE AT SETPOINT.

4. VENTILATION CONTROL

a. DURING OCCUPIED MODE, THE AIR FLOW MEASURING OUTDOOR AIR DAMPER SHALL MODULATE TO MAINTAIN THE SCHEDULED MINIMUM OUTDOOR AIRFLOW AS MEASURED AT THE AIRFLOW MEASURING MIXED AIR DAMPERS (TRAQ). THE RETURN AIR DAMPER IS MECHANICALLY LINKED TO OPERATE INVERSELY TO THE OUTSIDE AIR DAMPER.

b. THE EXHAUST DAMPER FROM THE RA SHALL BE OPEN.

C. UNOCCUPIED MODE

1. THE SUPPLY FAN SHALL BE OFF, THE MIXING BOX OUTSIDE AIR DAMPER SHALL BE CLOSED AND THE RETURN AIR DAMPER FULLY OPEN, AND THE GENERAL EXHAUST DAMPER FROM THE RA SHALL BE CLOSED.

2. IF SPACE TEMPERATURE DROPS BELOW ITS UNOCCUPIED HEATING TEMPERATURE SETPOINT, OR RISES ABOVE ITS UNOCCUPIED COOLING TEMPERATURE SETPOINT, THE SUPPLY AIR FAN SHALL START AND RAMP UP TO 75% SPEED (ADJUSTABLE). THE OUTSIDE AIR DAMPERS AND EXHAUST DAMPERS SHALL REMAIN CLOSED AND THE RETURN AIR DAMPERS SHALL REMAIN OPEN.

a. COOLING: THE UNIT VRF COOLING COIL SHALL MODULATE TO MAINTAIN SUPPLY AIR TEMPERATURE AT MINIMUM.

b. HEATING: THE UNIT HEATING COIL SHALL MODULATE TO MAINTAIN SUPPLY AIR TEMPERATURE AT MAXIMUM.

c. IF THE SPACE HAS NOT REACHED THE UNOCCUPIED TEMPERATURE SETPOINT AFTER 20 MINUTES (ADJUSTABLE), THE SUPPLY FAN SPEED SHALL BE INCREASED TO MAXIMUM (AS SET DURING BALANCING) UNTIL THE SPACE IS AT THE UNOCCUPIED SETPOINT. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED

d. WHEN ALL SPACES ARE WITHIN THEIR UNOCCUPIED TEMPERATURE SETPOINTS, THE SUPPLY AIR FAN SHALL STOP.

3. UNOCCUPIED OVERRIDE

a. WHEN THE UNOCCUPIED OVERRIDE BUTTON ON THE SPACE THERMOSTAT IS PRESSED FOR ONE SECOND OR MORE, AHU-1, AHU-2, AHU-3, AND DOAS-3 SHALL START AND RUN IN OCCUPIED MODE FOR 2 HOURS (ADJUSTABLE), THEN SWITCH BACK TO UNOCCUPIED MODE. PRESSING THE OVERRIDE BUTTON WHILE THE SYSTEM IS RUNNING IN OVERRIDE MODE SHALL RESET THE OCCUPIED MODE RUN TIME.

D. ALARMS

1. FAN STATUS-COMMAND

a. IF THE FAN STATUS DIFFERS FROM THE COMMAND FOR 15 SECONDS, GENERATE ALARM.

2. DIRTY FILTER

a. IF THE DIFFERENTIAL PRESSURE SENSOR ACROSS THE PRE-FILTERS EXCEEDS 0.75 INCH (ADJUSTABLE) FOR 5 MINUTES WHEN AIRFLOW EXCEEDS 80%, GENERATE ALARM AT THE BAS WORKSTATION.

b. IF THE DIFFERENTIAL PRESSURE SENSOR ACROSS THE FINAL FILTERS EXCEEDS 1.0 IN WC (ADJUSTABLE) FOR 5 MINUTES WHEN AIRFLOW EXCEEDS 80%, GENERATE ALARM AT THE BAS WORKSTATION.

3. WIRE DUCT SMOKE DETECTORS TO SHUT DOWN THE AHU-3 SUPPLY FAN AND DOAS-3 AND GENERATE AN ALARM ON THE BAS AND FIRE ALARM SYSTEM IF SMOKE IS DETECTED IN THE RETURN AIR.

E. AUTOMATIC FAULT DETECTION AND DIAGNOSTICS (AFDD)

1. AFDD CONDITIONS ARE EVALUATED CONTINUOUSLY AND SEPARATELY FOR EACH OPERATING AHU.

2. THE FOLLOWING VALUES SHALL BE CONTINUOUSLY CALCULATED BY THE AFDD ROUTINES FOR EACH AHU:

a. FIVE MINUTE ROLLING AVERAGES WITH 1-MINUTE SAMPLING TIME OF THE FOLLOWING POINT VALUES; OPERATOR SHALL HAVE THE ABILITY TO ADJUST THE AVERAGING WINDOW AND SAMPLING PERIOD OF EACH POINT INDEPENDENTLY

1) SUPPLY AIR TEMPERATURE

2) MIXED AIR TEMPERATURE

3) RETURN AIR TEMPERATURE

4) OUTDOOR AIR TEMPERATURE

5) DUCT STATIC PRESSURE

6) COOLING COIL ENTERING AIR TEMPERATURE

7) COOLING COIL LEAVING AIR TEMPERATURE

3. THE INTERNAL AFDD VARIABLES SHOWN BELOW SHALL BE DEFINED FOR EACH AHU. ALL PARAMETERS ARE ADJUSTABLE BY THE OPERATOR WITH INITIAL VALUES AS FOLLOWS:

a. TEMP RISE ACROSS SUPPLY FAN = 2 DEG F

b. TEMP ERROR THRESHOLD FOR SUPPLY, RETURN, AND OUTSIDE AIR TEMP SENSOR = 2 DEG F

c. TEMP ERROR THRESHOLD FOR MIXED AIR TEMP SENSOR = 5 DEG F

d. AIRFLOW ERROR THRESHOLD = 30%

e. VFD SPEED ERROR THRESHOLD = 5%

f. DUCT STATIC PRESSURE ERROR THRESHOLD = 0.1"

g. COOLING COIL ENTERING/LEAVING TEMP SENSOR ERROR = 2 DEG F

h. TIME IN MINUTES THAT A FAULT MUST PERSIST BEFORE TRIGGERING AN ALARM = 30 MIN.

4. THE FOLLOWING FAULT CONDITIONS SHALL BE ANALYZED

a. DUCT STATIC PRESSURE TOO LOW WITH FAN AT FULL SPEED

b. MIXED AIR TEMP TOO LOW OR TOO HIGH; SHOULD BE BETWEEN RA TEMP AND OA TEMP

c. SUPPLY AIR TEMP TOO HIGH; SHOULD BE LESS THAN MIXED AIR TEMP

d. SUPPLY AIR TEMP TOO HIGH IN COOLING; SHOULD BE LOWER THAN MIXED AIR TEMP

e. SUPPLY AIR TEMP TOO LOW IN HEATING; SHOULD BE HIGHER THAN MIXED AIR TEMP

f. TEMPERATURE DROPS ACROSS INACTIVE COOLING COIL

g. TEMPERATURE RISE ACROSS INACTIVE HEATING COIL

5. EVALUATION OF FAULT CONDITIONS SHALL BE SUSPENDED WHEN AHU IS NOT RUNNING OR FOR 30 MINUTES AFTER A CHANGE IN OPERATING MODE (I.E. UNOCCUPIED TO OCCUPIED MODE)

1.10 HEATING COIL, HC-4

A. WHEN AHU-3 IS ON IN OCCUPIED MODE OR DURING UNOCCUPIED HEATING, HEATING COIL CONTROL VALVE SHALL MODULATE OPEN, SUBJECT TO A MAXIMUM DISCHARGE AIR TEMPERATURE OF 90 DEG F (ADJUSTABLE), TO MAINTAIN SPACE TEMPERATURE AT SETPOINT.

1. HIGH DISCHARGE AIR TEMPERATURE

a. IF THE DISCHARGE AIR TEMPERATURE IS ABOVE 100 DEG F (ADJ) FOR MORE THAN 5 MINUTES, GENERATE ALARM.

1.11 ROOFTOP AIR HANDLING UNIT AHU-4

A. AHU-4 IS A SINGLE ZONE VAV AIR HANDLING UNIT WITH A 30% PROPYLENE GLYCOL HEATING COIL AND DX COOLING COIL.

B. OCCUPIED MODE

1. THE SUPPLY FAN SHALL RUN CONTINUOUSLY WHENEVER THE UNIT IS IN OCCUPIED MODE.

2. SUPPLY FAN SPEED CONTROL SETTINGS

a. PROVIDE RAMP FUNCTION TO PREVENT CHANGES IN FAN SPEED OF MORE THAN 10% PER MINUTE

b. MAXIMUM FAN SPEED SHALL BE THE SCHEDULED SUPPLY AIRFLOW.

c. MINIMUM FAN SPEED SHALL BE 40% OF MAXIMUM SPEED (ADJUSTABLE).

3. SUPPLY AIR TEMPERATURE AND SUPPLY FAN SPEED CONTROL

a. UNIT CONTROLLER SHALL MODULATE INTEGRAL DX COOLING, PROPYLENE GLYCOL COIL HEATING CONTROL VALVE, FAN SPEED, AND OUTSIDE AIR DAMPERS IN SEQUENCE TO MAINTAIN SPACE TEMPERATURE AT SETPOINT.

b. SUPPLY AIR TEMPERATURE SHALL BE RESET FROM A MINIMUM DISCHARGE AIR TEMPERATURE OF 55 DEG F (ADJUSTABLE) UP TO A MAXIMUM OF 95 DEG F (ADJUSTABLE).

c. IF RETURN AIR HUMIDITY RISES ABOVE 50% RELATIVE HUMIDITY AT 75 DEG F (ADJUSTABLE), COOLING COIL DISCHARGE TEMPERATURE SHALL BE SET TO 55 DEG F (ADJUSTABLE) AND THE INTEGRAL HOT GAS REHEAT COIL SHALL MODULATE TO MAINTAIN SUPPLY AIR TEMPERATURE AT THE RESET SETPOINT.

4. VENTILATION CONTROL

a. THE OUTDOOR AIR DAMPER SHALL MODULATE TO MINIMUM POSITION DETERMINED DURING BALANCING TO PROVIDE THE SCHEDULED MINIMUM OUTSIDE AIRFLOW. THE RETURN AIR DAMPER IS MECHANICALLY LINKED TO OPERATE INVERSELY TO THE OUTSIDE AIR DAMPER.

b. ECONOMIZER CONTROL: WHEN OUTSIDE AIR ENTHALPY IS LESS THAN RETURN AIR ENTHALPY, THE OUTSIDE AIR DAMPERS SHALL MODULATE OPEN AND THE RETURN AIR DAMPERS SHALL CLOSE IN PROPORTION TO HELP MAINTAIN SPACE TEMPERATURE AT SETPOINT (FREE COOLING). DX COOLING SHALL BE AVAILABLE DURING ECONOMIZER OPERATION IF NEEDED. EXHAUST AIR SHALL BE RELIEVED THROUGH THE UNIT BAROMETRIC RELIEF DAMPERS.

c. DEMAND CONTROLLED (CO2) VENTILATION: THE OUTSIDE AIR DAMPERS SHALL MODULATE OPEN AND THE RETURN AIR DAMPERS SHALL CLOSE IN PROPORTION TO MAINTAIN RA CO2 BELOW 850 PPM (ADJUSTABLE). DX COOLING OR HOT WATER HEATING SHALL BE AVAILABLE IF NEEDED TO MAINTAIN SPACE TEMPERATURE AT SETPOINT WITH ADDITIONAL VENTILATION AIR. EXHAUST AIR SHALL BE RELIEVED THROUGH THE UNIT BAROMETRIC RELIEF DAMPERS.

C. UNOCCUPIED MODE

1. THE SUPPLY FAN SHALL BE OFF, THE MIXING BOX OUTSIDE AIR DAMPER SHALL BE CLOSED AND THE RETURN AIR DAMPER FULLY OPEN.

2. WHEN THE SUPPLY FAN IS OFF, THE HOT WATER CONTROL VALVE SHALL MODULATE TO MAINTAIN INTERNAL UNIT TEMPERATURE (CLOSEST TEMPERATURE SENSOR TO HW COIL) AT 60 DEG F (ADJUSTABLE).

3. IF SPACE TEMPERATURE DROPS BELOW ITS UNOCCUPIED HEATING TEMPERATURE SETPOINT, THE SUPPLY AIR FAN SHALL START AND RAMP UP TO 75% SPEED (ADJUSTABLE). THE OUTSIDE AIR DAMPERS SHALL REMAIN CLOSED AND THE RETURN AIR DAMPERS SHALL REMAIN OPEN.

a. THE UNIT HEATING COIL SHALL MODULATE TO MAINTAIN SUPPLY AIR TEMPERATURE AT MAXIMUM.

b. IF THE SPACE HAS NOT REACHED THE UNOCCUPIED TEMPERATURE SETPOINT AFTER 20 MINUTES (ADJUSTABLE), THE SUPPLY FAN SPEED SHALL BE INCREASED TO MAXIMUM (AS SET DURING BALANCING) UNTIL THE SPACE IS AT THE UNOCCUPIED SETPOINT. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED

c. WHEN THE SPACE ARE WITHIN THEIR UNOCCUPIED TEMPERATURE SETPOINTS, THE SUPPLY AIR FAN SHALL STOP.

4. UNOCCUPIED OVERRIDE

a. WHEN THE UNOCCUPIED OVERRIDE BUTTON ON THE SPACE THERMOSTAT IS PRESSED FOR ONE SECOND OR MORE, AHU-4 SHALL START AND RUN IN OCCUPIED MODE FOR 2 HOURS (ADJUSTABLE), THEN SWITCH BACK TO UNOCCUPIED MODE. PRESSING THE OVERRIDE BUTTON WHILE THE SYSTEM IS RUNNING IN OVERRIDE MODE SHALL RESET THE OCCUPIED MODE RUN TIME.

D. ALARMS

1. FAN STATUS-COMMAND

a. IF THE FAN STATUS DIFFERS FROM THE COMMAND FOR 15 SECONDS, GENERATE ALARM.

2. DIRTY FILTER

a. IF THE DIFFERENTIAL PRESSURE SENSOR ACROSS THE PRE-FILTERS EXCEEDS 0.75 INCH (ADJUSTABLE) FOR 5 MINUTES WHEN AIRFLOW EXCEEDS 80%, GENERATE ALARM AT THE BAS WORKSTATION.

b. IF THE DIFFERENTIAL PRESSURE SENSOR ACROSS THE FINAL FILTERS EXCEEDS 1.0 IN WC (ADJUSTABLE) FOR 5 MINUTES WHEN AIRFLOW EXCEEDS 80%, GENERATE ALARM AT THE BAS WORKSTATION.

3. WIRE DUCT SMOKE DETECTORS TO SHUT DOWN THE AHU-4 SUPPLY FAN AND GENERATE AN ALARM ON THE BAS AND FIRE ALARM SYSTEM IF SMOKE IS DETECTED IN THE RETURN AIR.

4. LOW TEMPERATURE DETECTION (FREEZESTAT):

A. AUTOMATIC RESET FREEZESTAT LOCATED IMMEDIATELY DOWNSTREAM OF THE HOT WATER HEATING COIL SHALL SET THE UNIT TO UNOCCUPIED MODE (FANS OFF AND OA DAMPERS CLOSED), OVERRIDE THE HEATING COIL VALVE TO 50% OPEN (ADJUSTABLE), AND GENERATE AN ALARM IF ANY PART OF THE AIRSTREAM DROPS BELOW 20 DEG F (ADJUSTABLE).

B. FREEZESTAT SHALL AUTOMATICALLY RESET AFTER 5 MINUTES (ADJUSTABLE) AND THE UNIT SHALL RESTART AND REVERT TO NORMAL OPERATION.

C. IF THE FREEZESTAT TRIPS MORE THAN 3 TIMES WITHIN 30 MINUTES (ADJUSTABLE), THE UNIT SHALL BE LOCKED OUT IN UNOCCUPIED MODE AND A CRITICAL ALARM SHALL BE DISPLAYED AT THE BAS WORKSTATION.

1.12 STAIR CONVECTORS / FIN TUBED RADIATOR

A. HEATING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE AT SETPOINT.

1.13 DEHUMIDIFIER

A. DH-1 SHALL OPERATE CONTINUOUSLY 24/7 SUBJECT TO ITS OWN CONTROLS TO MAINTAIN COLD ROOM SPACE HUMIDITY AT 30% RH AT 50 DEG F (ADJUSTABLE) (DEWPOINT 21.2 DEG F).

B. THE EXISTING REFRIGERATION UNIT SHALL OPERATE CONTINUOUSLY ON ITS OWN CONTROL TO MAINTAIN COLD ROOM TEMPERATURE AT SETPOINT.

1.14 4TH FLOOR CONSERVATION LAB PAINT BOOTH:

SF-1, HC-1, D-8

A. UPON A RELAY SIGNAL INDICATING THE PAINT BOOTH EXHAUST FAN IS ON, THE OUTSIDE AIR DAMPER SHALL OPEN AND THE SUPPLY FAN SHALL TURN ON IN SEQUENCE.

B. WHEN THE SUPPLY FAN IS ON, THE HEATING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN LEAVING AIR TEMPERATURE OF 68 DEG F (ADJ).

C. UPON A RELAY SIGNAL INDICATING THE PAINT BOOTH EXHAUST FAN IS OFF, THE SUPPLY FAN SHALL TURN OFF AND THE OUTSIDE AIR DAMPER SHALL CLOSE IN SEQUENCE.

D. WHEN THE SUPPLY FAN IS OFF, THE HEATING COIL CONTROL VALVE SHALL CLOSE.

E. WHEN THE SUPPLY FAN IS OFF AND OUTSIDE AIR TEMPERATURE IS LESS THAN 20 DEG F, THE HEATING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN DUCT TEMPERATURE DOWNSTREAM OF COIL AT 60 DEG F (ADJUSTABLE).

F. ALARMS

1. FREEZE PROTECTION

a. IF THE DISCHARGE AIR TEMPERATURE IS BELOW 30 DEG F (ADJ) FOR MORE THAN 5 MINUTES, GENERATE ALARM, TURN OFF SUPPLY FAN, AND CLOSE OUTSIDE AIR DAMPER.

2. HIGH DISCHARGE AIR TEMPERATURE

a. IF THE DISCHARGE AIR TEMPERATURE IS ABOVE 100 DEG F (ADJ) FOR MORE THAN 5 MINUTES, GENERATE ALARM.

3. FAN STATUS-COMMAND

a. IF THE FAN STATUS DIFFERS FROM THE COMMAND FOR 15 SECONDS, GENERATE ALARM.

1.15 1ST FLOOR WORKSHOP PAINT BOOTH: HC-2, D-9

A. UPON A RELAY SIGNAL INDICATING THE PAINT BOOTH EXHAUST FAN IS ON, THE OUTSIDE AIR DAMPER SHALL OPEN.

B. WHEN THE OUTSIDE AIR DAMPER IS OPEN, THE HEATING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN LEAVING AIR TEMPERATURE OF 68 DEG F (ADJ).

C. UPON A RELAY SIGNAL INDICATING THE PAINT BOOTH EXHAUST FAN IS OFF, THE OUTSIDE AIR DAMPER SHALL CLOSE AND THE HEATING COIL CONTROL VALVE SHALL CLOSE.

D. ALARMS

1. FREEZE PROTECTION

a. IF THE DISCHARGE AIR TEMPERATURE IS BELOW 30 DEG F (ADJ) FOR MORE THAN 5 MINUTES, GENERATE ALARM AND CLOSE OUTSIDE AIR DAMPER.

2. HIGH DISCHARGE AIR TEMPERATURE

a. IF THE DISCHARGE AIR TEMPERATURE IS ABOVE 100 DEG F (ADJ) FOR MORE THAN 5 MINUTES, GENERATE ALARM

3. DAMPER STATUS-COMMAND

a. IF THE FAN STATUS DIFFERS FROM THE COMMAND FOR 15 SECONDS, GENERATE ALARM.

1.16 EXISTING PAINT BOOTH EXHAUST FANS

A. EXISTING EXHAUST FANS SERVING 1ST AND 4TH FLOOR PAINT BOOTHS HAVE MANUAL CONTROLS LOCATED IN THEIR RESPECTIVE SPACES.

B. PROVIDE GRAPHIC AND FAN STATUS MONITORING CAPABILITIES AT BAS WORKSTATION.

1.17 UNIT HEATERS

A. THE UNIT HEATER CONTROL VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE SETPOINT.

B. THE UNIT HEATER FAN SHALL RUN ANY TIME THE HEATING COIL CONTROL VALVE IS OPEN.

C. THE FAN SHALL CONTINUE TO RUN FOR 15 MINUTES (ADJ) AFTER THE HEATING COIL HAS CLOSED.

1.18 HOT WATER PLANT

A. BOTH INDEPENDENT HOT WATER PLANTS (100% WATER PLANT AND 30% PROPYLENE GLYCOL / WATER PLANT) SHALL USE THE SAME SEQUENCE OF OPERATION BUT HAVE SEPARATE TEMPERATURE RESET SETPOINTS.

B. PLANT ENABLE/DISABLE

1. THE DEFAULT SCHEDULE SHALL BE 24/7

2. ENABLE THE PLANT WHEN OUTSIDE AIR TEMPERATURE IS LESS THAN 65 DEG F (ADJ)

3. DISABLE THE PLANT WHEN OUTSIDE AIR TEMPERATURE IS GREATER THAN OR EQUAL TO 65 DEG F (ADJ)

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4. WHEN THE PLANT IS ENABLED:
   a. STAGE ON THE LEAD PRIMARY HW PUMP
   b. ONCE THE LEAD PUMP HAS PROVEN ON, MODULATE THE 1/3 STEAM CONTROL VALVE OPEN TO MAINTAIN LEAVING WATER TEMPERATURE SETPOINT.
5. WHEN THE PLANT IS DISABLED
   a. CLOSE BOTH STEAM CONTROL VALVES
   b. CONTINUE TO RUN THE PRIMARY HW PUMP FOR 5 MINUTES (ADJ) AFTER STEAM CONTROL VALVE POSITIONS ARE BOTH AT 0%.

C. HOT WATER TEMPERATURE CONTROL:
1. HOT WATER SYSTEM ENABLE/DISABLE
   a. HOT WATER SYSTEMS SHALL BE ENABLED WHEN THE OUTSIDE AIR TEMPERATURE IS LOWER THAN THE SYSTEM ENABLE SETPOINT, INITIALLY 65 DEG F (ADJUSTABLE). WHEN THE SYSTEM IS ENABLED, THE ASSOCIATED PUMP SHALL BE ENABLED.
      1) THE THREE-WAY DIVERTING CONTROL VALVE CV-1 IN THE B-5 MECHANICAL ROOM SHALL SWITCH TO DIVERT HOT WATER TO CIRCULATE HEATING HOT WATER THROUGHOUT THE BUILDING.
   b. WHEN OUTSIDE AIR TEMPERATURE IS WARMER THAN THE ENABLE SETPOINT, THE STEAM CONTROL VALVES SHALL BE CLOSED AND THE ASSOCIATED PUMPS SHALL BE OFF.
      1) THE THREE-WAY DIVERTING CONTROL VALVE CV-1 IN THE B-5 MECHANICAL ROOM SHALL SWITCH TO DIVERT HOT WATER SUPPLY TO HOT WATER RETURN SO HEATING HOT WATER DOES NOT CIRCULATE THROUGH THE REST OF THE BUILDING.
2. HOT WATER RESET CONTROL
   a. PROVIDE TEMPERATURE SENSOR IN THE HEATING HOT WATER SUPPLY PIPING AND OUTDOOR AIR. RESET THE HEATING HOT WATER SUPPLY TEMPERATURE FROM 170 DEG F (ADJ) AT 20 DEG F (ADJ) OUTDOOR AIR TEMPERATURE TO 130 DEG F (ADJ) HEATING HOT WATER SUPPLY TEMPERATURE AT 60 DEG F (ADJ) OUTDOOR AIR TEMPERATURE. ALL SETPOINTS SHALL BE ADJUSTABLE. LIMIT RESET FREQUENCY TO NO MORE THAN ONCE EVERY 15 MINUTES (ADJUSTABLE).
3. STEAM CONTROL
   a. ONCE THE TEMPERATURE SETPOINT HAS BEEN ESTABLISHED BEGIN MODULATING THE 1/3 STEAM CONTROL VALVE TO MAINTAIN HOT WATER SUPPLY TEMPERATURE AT SETPOINT. OPEN THE 1/3 VALVE AS THE TEMPERATURE DECREASES AND MODULATE CLOSED AS THE TEMPERATURE INCREASES.
   b. ONCE THE 1/3 VALVE HAS REACHED 100% FOR 5 MINUTES (ADJ), ENABLE THE 2/3 VALVE. ONCE THE 2/3 VALVE HAS BEEN ENABLED, REVERT PRIMARY CONTROL OVER TO THE 2/3 VALVE AND CLOSE THE 1/3 VALVE.
   c. ONCE THE 2/3 VALVE HAS REACHED 100%, BEGIN MODULATING THE 1/3 VALVE OPEN TO MAINTAIN SUPPLY WATER TEMPERATURE SETPOINT.
   d. REVERSE THE SEQUENCE AS THE DEMAND DECREASES. RE-ESTABLISH PRIMARY CONTROL OF THE 1/3 VALVE, ONCE THE 2/3 VALVE COMMAND HAS REACHED 15% (ADJ) OR LESS FOR 5 MINUTES (ADJ).

D. HEATING PUMP CONTROL
1. THE PUMPS FOR EACH WATER LOOP SHALL BE SELF-SENSING PUMPS WITH INTEGRAL VFD AND CONTROLLERS PROVIDED BY THE PUMP MANUFACTURER.
2. LEAD/LAG CONTROL
   a. THE LEAD PUMP SHALL RUN CONTINUOUSLY WHENEVER THE HOT WATER SYSTEM IS ENABLED. THE LAG PUMP PROVIDES BACKUP. WHEN THE HOT WATER SYSTEM IS DISABLED, THE PUMPS SHALL BE OFF.
   b. IF THE LEAD PUMP FAILS (AS INDICATED BY THE PUMP CONTROLLER), THE LAG PUMP SHALL BECOME THE LEAD PUMP AND RUN CONTINOUSLY. THE FAILED PUMP SHALL BE LOCKED OUT AND AN ALARM SHALL BE INDICATED ON THE BAS GRAPHIC.
   c. THE LEAD AND BACKUP PUMPS SHALL BE SET TO AUTOMATICALLY ALTERNATE ONCE EACH MONTH (ADJUSTABLE).
3. PUMP SPEED CONTROL
   a. MINIMUM PUMP SPEED SHALL BE THE GREATER OF 20% OF PUMP SPEED AT DESIGN FLOW OR THE MINIMUM PUMP SPEED THE VFD ALLOWS THE PUMP TO SAFELY OPERATE.
   b. THE LEAD PUMP SHALL START AT MINIMUM SPEED AND SLOWLY RAMP UP TO THE SPEED REQUIRED TO MAINTAIN SYSTEM DIFFERENTIAL PRESSURE.
   c. THE PUMP CONTROLLERS SHALL BE PROGRAMMED TO PROVIDE CONSTANT DIFFERENTIAL PRESSURE. THE PUMP PRESSURE SETTING SHALL BE INITIALLY SET TO THE SCHEDULED PUMP HEAD, THEN ADJUSTED IN COORDINATION WITH THE BALANCING CONTRACTOR TO THE LOWEST PRESSURE THAT PROVIDES THE SCHEDULED FLOW RATE TO EACH COIL. THE PUMP CONTROLLER SHALL MODULATE THE LEAD PUMP SPEED TO MAINTAIN SYSTEM DIFFERENTIAL PRESSURE AT SETPOINT.

E. DOMESTIC HOT WATER (DHW) CONTROL
1. WHEN THERE IS A CALL FOR HEATING FROM WH-1, OPEN THE 2-POSITION DHW CONTROL VALVE. IF THE HOT WATER RESET TEMPERATURE IS LESS THAN 160 DEG F, OVERRIDE THE HOT WATER TEMPERATURE SETPOINT TO 160 DEG F (ADJUSTABLE). WHEN DHW TEMPERATURE IN WH-1 REACHES SETPOINT, CLOSE THE DHW CONTROL VALVE AND RELEASE THE HOT WATER RESET OVERRIDE.
2. WHEN OUTSIDE AIR IS WARMER THAN THE HOT WATER SYSTEM ENABLE SETPOINT (SO THE HOT WATER SYSTEM IS OFF), OVERRIDE THE HOT WATER SYSTEM AND THE ASSOCIATED PUMPS ON AND ENABLE STEAM CONTROL VALVES TO HX-2. DHW HEATING SHALL THEN FUNCTION NORMALLY.
3. THE DHW RECIRCULATION PUMP P-5 SHALL RUN WHEN ANY ZONE IN THE BUILDING IS IN OCCUPIED MODE. WHEN ALL ZONES IN THE BUILDING ARE IN UNOCCUPIED MODE, P-5 SHALL BE OFF.

F. ALARMS
1. LOW LEAVING HW TEMP
   a. WHEN LEAVING HOT WATER TEMP IS 15 DEG F (ADJ) BELOW SETPOINT FOR MORE THAN 15 MINUTES, GENERATE ALARM.
2. HIGH LEAVING HW TEMP
   a. WHEN LEAVING HOT WATER TEMP IS 10 DEG F (ADJ) ABOVE SETPOINT FOR MORE THAN 10 MINUTES, GENERATE ALARM AND CLOSE STEAM CONTROL VALVES.
3. PUMP ALARM
   a. WHEN STATUS IS DIFFERENT FROM COMMAND FOR MORE THAN 15 MINUTES, GENERATE ALARM.
4. SENSOR ALARM
   a. SENSOR SHALL BE DEEMED OUTSIDE ITS WIDEST POSSIBLE RANGE IF ANY OF THE FOLLOWING ARE TRUE:
      1) FEEDBACK LESS THAN 2 mA FROM ANY 4 TO 20 mA TRANSDUCER.
      2) TEMPERATURE READING OF LESS THAN 0 DEG F FROM ANY TEMPERATURE SENSOR.
   b. IF ANY SENSOR GOES OUTSIDE ITS WIDEST POSSIBLE OPERATING RANGE, GENERATE ALARM.

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