



ADDENDUM#2

October 23, 2023

PROPOSAL NUMBER: UCA-24-020
OPENING DATE: October 24, 2023
OPENING TIME: 2:00 p.m.
PROJECT: Snow Fine Arts HVAC Upgrades

The attached addendum forms a part of the contract documents and modifies or interprets the proposal documents, as noted below.

Receipt of this addendum is required by acknowledging on Bid Form Section 004113, line item #6.

If you have any questions concerning this addendum, please contact Pam Giblet 501-450-3156.

Cordially,

A handwritten signature in purple ink that reads "Pam Giblet".

Pam Giblet
Construction and Contract Manager

PROJECT: UCA Snow Fine Arts Center Renovation

UCA Project #: UCA-24-020

Arch Project #: 21200.C

ADDENDUM NUMBER: 2

TO: PROJECT MANUAL AND DRAWINGS

FOR: University of Central Arkansas

Conway, Arkansas

DATE: October 20, 2023

BID DATE: **October 24, 2023 2:00 P.M.**

This addendum forms a part of the Contract Documents and modifies or interprets the Project Manual and Drawings, as noted below. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject bidder to disqualification.

ARCHITECTURAL ADDENDUM ITEMS – PROJECT MANUAL:

- A1.** REFER to Table of Contents
 - A. **REFER** to spec section: 01 5000 TEMPORARY FACILITIES AND CONTROLS
 - 1. **ADD** attached construction zone diagram
- A2.** **REFER** to attached Specification Section 01 21 00 – Cash Allowances.
- A3.** REFER to Table of Contents
 - A. **ADD** spec section:
 - 1. 01 9113 GENERAL COMMISSIONING REQUIREMENTS
- A4.** REFER to 23 0800 COMMISSIONING OF HVAC SYSTEMS
 - A. **REVISE** SECTION 1.3

A. The following equipment and systems shall be commissioned as part of this project. All general references to equipment and systems within this document refer only to those identified below:

1. Rooftop VAV Air Handling Units

2. Indoor VAV Air Handling Unit

3. Air Terminal Boxes

4. Exhaust Fans

5. Existing Boilers

6. Pumps

7. Existing Chiller

8. Existing Cooling Tower

9. Reheat Coils

10. Fan Coil Unit

11. Unit Heaters

12. Air / Dirt Separator

13. Expansion Tank

14. Ductless Split Systems

15. Ultraviolet (UV) Lights

16. Variable Frequency Drives

17. Relief Fans

18. Air Distribution

19. Building Automation and Control Systems

A5. REFER to 23 0800 COMMISSIONING OF HVAC SYSTEMS

A. REVISE SECTION 'B' OF 1.7 COMMISSIONING SUBMITTALS

B. The following are the minimum submittals that the CxA will review. Additional submittals may be reviewed at the CxA's discretion:

1. 23 0515 Variable Frequency Motor Controls – Buildings & HVAC

2. 23 0516 Expansion Compensation in Heating, Ventilation and Air conditioning Systems

3. 23 0519 Meters and Gauges for HVAC

4. 23 0523 Valves

5. 23 0529 Hangers and Supports for HVAC Piping and Equipment

6. 23 0553 Identification for HVAC Piping and Equipment

7. 23 0566 UVC Emitter Ultra Violet Disinfection

8. 23 0593 Testing, Adjusting, and Balancing for Heating, Ventilating and Air Conditioning

9. 23 0713 Duct Insulation for Heating, Ventilating and Air Conditioning

10. 23 0716 HVAC Equipment Insulation

11. 23 0719 HVAC Piping Insulation

12. 23 0923 Direct Digital Control System for HVAC

13. 23 2113 Hydronic Piping

14. 23 2114 Hydronic Specialties

15. 23 2123 Hydronic Pumps

16. 23 2500 HVAC Water Treatment

17. 23 3100 HVAC Ducts and Casings

18. 23 3300 Air Duct Accessories

19. 23 3423 HVAC Power Ventilators

20. 23 3616 Air Terminal Units – Variable Volume

21. 23 3700 Air Inlets and Outlets

~~22. 23 52 16 Condensing Boilers~~

23. 23 7313 Central Station Air Handlers

REFER to 23 0800 COMMISSIONING OF HVAC SYSTEMS

B. **REVISE** SECTION 3.9

A. The GC/CM is responsible for execution of Owner Training as **outlined within the various spec sections.**

A6. REPLACE the original Specification Section 23- 09 23 – Automatic Temperature Controls with the attached version.

ARCHITECTURAL ADDENDUM ITEMS – DRAWINGS:

A1. REFER to Sheet A1.13 detail 5

A. **REFER** to Building Section note “PATCH & REPAIR ROOF AS REQD.”
CLARIFICATION: Roof was replaced in 2018 with TPO. The product is under the manufacturer's 20-year warranty (Golden Seal Total Roofing System-Carlisle) – See attached warranty document.

MECHANICAL ADDENDUM ITEMS – DRAWINGS:

A1. REFER to Sheet M1.2B, Detail 1 – Level 1 Plan – Renov Part B – HVAC Ductwork:
ADD to following note: All transfer and return ductwork shall be internally insulated. Refer to Specification Section 23 07 13 – Duct Insulation for HVAC for guidelines for internal insulation.

A2. REFER to Sheets M1.2B, M1.4B, and M1.7B:
ADD to following note: All manual dampers and access doors shall be field coordinated with existing / new walls, furr downs, and ductwork. Coordinate exact locations with all trades.

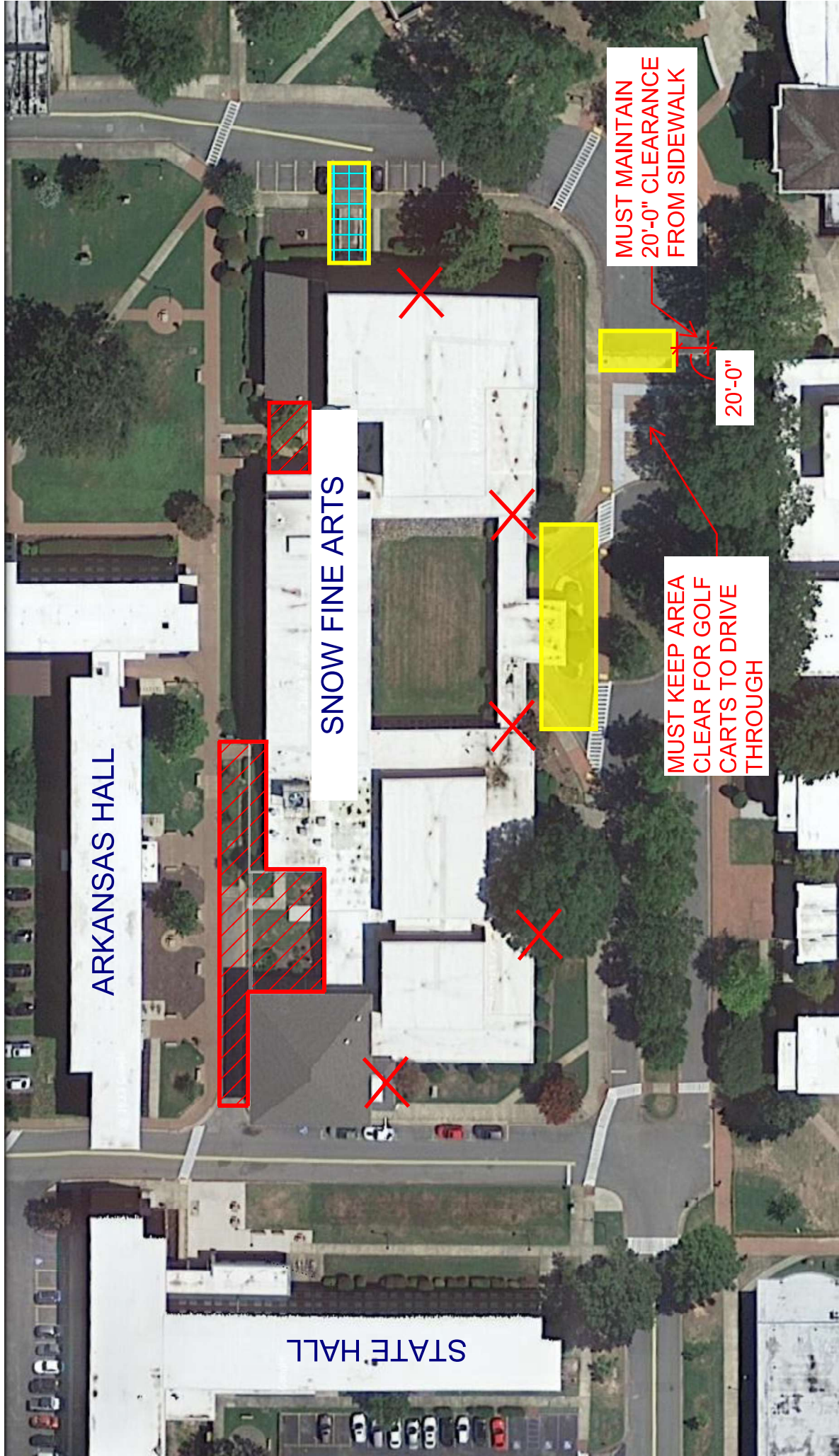
A3. REFER to Sheet M1.3B, Detail 1 – Level 1 Plan – Renov Part B – HVAC Piping:
1) Relocate thermostat for ST2-08 to strike side of door nearest to the return air grille.

- A4. REFER** to Sheet M1.3B, 1.5B, M1.6C, and 1.7B:
1) **ADD** the following note: Coordinate final locations for thermostats with owner/engineer/commissioning agent.
- A5. REFER** to attached Sheet M1.6C, Detail 1 – Level 2 Plan – Renov Part C – HVAC for revisions to the installation of AH-6.
- A6. REFER** to attached Sheet M1.9 for clarifications on the mechanical room piping scope.
- A7. REFER** to Sheet M3.1, Detail 9 – VAV Air Terminal Piping and Mounting Detail: Add vibration isolators at all-thread connections to VAV terminals.
- A8. REFER** to Sheet M3.3, Detail 9 – Mini-Split Condensing Unit Roof Support Detail: Add vibration isolation washers at support block connections.
- A9. REFER** to Sheet M4.1, Rooftop VAV Air Handling Unit Schedule.
DELETE Item 10 from the remarks column for RTU-1 and RTU-2. Standard unit colors shall be provided.
- A10. REFER** to attached Sheet M4.2, Indoor VAV Air Handling Unit Schedule for clarifications about the equipment base rail. Also, the minimum OSA CFM requirement for this unit shall be 600 CFM and the occupied OSA CFM requirement shall be 3,280 CFM.
- A11. REFER** to attached Sheets M5.1, M5.2, M5.4, and M5.5 for revisions to the equipment controls sequences and diagrams.
- A12. REFER** to attached Sheet M5.1, Detail 2 – Supply Air Terminal w/ Hot Water Reheat (Typical):
ADD the following note: VAV terminal thermostats shall be provided with dehumidification control. If the space temperature rises above 60% RH, the reheat coil valve shall modulate to maintain space temperature. During the dehumidification sequence, the discharge air temperature shall be limited to 72 degrees F (adj.).
- A13. REFER** to Sheet M5.1, Detail 3 – 4-Pipe Fan Coil Unit Control Diagram:
ADD the following note: Fan coil unit thermostats shall be provided with temperature and dehumidification control. If the space temperature rises above 60% RH, the chilled water valve shall open 100% and the reheat coil valve shall modulate to maintain space temperature. During the dehumidification sequence, the discharge air temperature shall be limited to 72 degrees F (adj.).
- A14. REFER** to Sheet M5.2, Detail 1 – Air Handling Unit RTU-1 (RTU-2 Similar) W/ Hot Water & Chilled Water Coils:
1) **ADD** the following note: The BAS shall monitor all VAV terminal thermostat/humidistat readings associated with an RTU, and if 2 (adj.) associated VAV terminals sense space humidity levels exceeding 60% RH (adj.) for 15 minutes (adj.), the RTU cooling coil DAT reset sequence shall be disabled until those humidity levels drop below 55% (adj.) for a period of 15 minutes (adj.).
2) **ADD** the following note: All supply fans shall be provided with individual CTs for fan status feedback. Controls contractor to coordinate quantity with approved equipment submittals

- 3) **REVISE** "Cooling Valve Control" to read "The cooling valve shall modulate to maintain the unit supply air discharge temperature of 55°F (adj.). The cooling valve shall be closed if the supply fan(s) are off, the supply air sensor has failed, or if the air handling unit is in the heating mode. If the temperature downstream of the IFB preheat coil is below 40F (adj.) then the cooling coil control valve shall be fully opened to help prevent freezing".
- 4) **ELIMINATE** "Heating" paragraph. Units shall not have reheat coils, and the preheat coil sequence is defined in the "Heating Valve Integral Face and Bypass Damper Control" paragraph.
- 5) **ADD** the following note: All duct detectors shall be provided and installed by the campus's fire alarm contractor. These devices and scope are required but not included in this contract scope. The contractor shall coordinate all requirements with the campus's fire alarm contractor.
- 6) **ADD** the following points to the points list that is monitored and alarmed at the air handling unit controller and the BAS: "23. Preheat Coil Valve Open %, 24. IFB Damper Open %".
- A15. REFER** to Sheet M5.3, Detail 1 – Air Handling Unit AH-6 W/ Hot Water & Chilled Water Coils:
- 1) **ADD** the following note: The BAS shall monitor AH-6's thermostat/humidistat readings, and if space humidity levels exceed 60% RH (adj.) for 15 minutes (adj.), the AH-6 cooling coil DAT reset sequence shall be disabled until the humidity level drops below 55% (adj.) for a period of 15 minutes (adj.).
- 2) **ADD** the following note: All supply fans shall be provided with individual CTs for fan status feedback. Controls contractor to coordinate quantity with approved equipment submittals
- 3) **REVISE** "Cooling Valve Control" to read "The cooling valve shall modulate to maintain the unit supply air discharge temperature of 55°F (adj.). The cooling valve shall be closed if the supply fan(s) are off, the supply air sensor has failed, or if the air handling unit is in the heating mode. If the temperature downstream of the IFB preheat coil is below 40F (adj.) then the cooling coil control valve shall be fully opened to help prevent freezing".
- 4) **REMOVE** the supply air high static limit sensor and supply air static pressure sensors.
- 5) **ADD** the following note: All duct detectors shall be provided and installed by the campus's fire alarm contractor. These devices and scope are required but not included in this contract scope. The contractor shall coordinate all requirements with the campus's fire alarm contractor.
- 6) **ADD** the following points to the points list that is monitored and alarmed at the air handling unit controller and the BAS: "23. Preheat Coil Valve Open %,24. IFB Damper Open %".

- 7) **REVISE** "Minimum Required Outdoor Airflow Setpoint" as follows: "During occupied times, the air handler outdoor air damper shall maintain the scheduled minimum OSA CFM airflow requirement. As the space CO2 levels rise from 500 ppm (adj.) to 1,000 ppm (adj.), the outdoor air damper setpoint shall modulate upwards linearly from the minimum OSA CFM airflow requirement to the occupied OSA CFM requirement.
- A16. REFER** to new Sheet M5.6, Constant Air Volume Mechanical Room Air Handling Unit – Sequence of Operation (EMS-X).
- A17. REFER** to attached sheets P1.1A, P1.4A, P1.4B, P1.4C, and P2.0 for new scope associated with rooftop gas piping for existing / new gas water heaters.
- A18. REFER** to attached sheets P0.00, P1.1B, P1.2B, P1.2C and P1.3B for scope clarifying the change from electric water heaters to gas water heaters.
- A19. REFER** to Sheet E1.01, Detail 2 – 1st Floor – Renov Plan Part A and B - Systems: New Panel M-2 shall be feed from the 'MSB' via a bus tap. Feeder Size shall be: 4-4/0, 1#4EG, 2-1/2" C. Provide and Install a 225A fused disconnect at the existing "MSB' to provide overcurrent protection for new Panel "M2."
- A20. REFER** to Sheet E1.03, Detail 1 - 2nd Floor – Renov Part C - Systems: The existing WH-1 shall remain. 30A/2P, NF, HD, Nema 1 Disconnect shall be omitted.
- A21. REFER** to Sheet E1.04, 3rd Floor – Renov Plan Part B - Systems: Both WH-1's shall be replaced with Commercial Gas Water Heaters in Lieu of Electric. 30A/2P, NF, HD, NEMA 1 Disconnect shall be omitted. Keyed Note #4 shall now read: Provide and install Junction Box to be connected to nearest spare 120V 20A/1P spare dedicated circuit. Install Breaker as needed.
- A22. REFER** to Sheets E1.03 and E1.05:
ADD the following note: All duct detectors shall be provided and installed by the campus's fire alarm contractor. These devices and scope are required but not included in this contract scope. The contractor shall coordinate all requirements with the campus's fire alarm contractor.

END OF ADDENDUM



STATE HALL

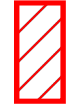
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SNOW FINE ARTS

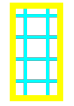
MUST MAINTAIN
20'-0" CLEARANCE
FROM SIDEWALK

20'-0"

MUST KEEP AREA
CLEAR FOR GOLF
CARTS TO DRIVE
THROUGH



FENCED CONSTRUCTION ZONE -
NO PARKING



LOADING/UNLOADING ZONE -
NO PARKING



PARKING



DO NOT ENTER

SECTION 01 91 13: GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. The work under this Section is subject to requirements of the Contract Documents including the Owner's General Conditions and articles of the Construction Manager's General Conditions.
- B. General Commissioning of the project will be executed outside of the general contract by an independent consultant to the OR. This document states the requirements of the Construction Manager/General contractor to assist the Commissioning Agent in the execution of his work.
- C. Commissioning shall be performed in accordance with the requirements of the Commissioning Standard under which the Commissioning Firm's qualifications are approved or identified within this specification. All quality assurance provisions of the Commissioning Standard such as performance guarantees shall be part of this contract. Commissioning procedures shall be developed by the Commissioning Agent and be in accordance with Commissioning Scope of Work. Where new procedures, requirements, etc. applicable to the Contract requirements have been published or adopted by the body responsible for the Commissioning Standard used (ACG, NEBB, or TABB), the requirements and recommendations in these procedures and requirements shall be considered mandatory.
- D. The commissioning process does not reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product in accordance with the Contract Documents.
- E. This section shall in no way diminish the responsibility of the Division 22, 23, and 26 Contractors, Subs and Suppliers in performing all aspects of work and testing as outlined in the contract documents. Any requirements outlined in this section are in addition to requirements outlined in Division 22, 23, and 26 Specifications.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. The requirements in this section are in addition to those specifically outlined in:

1. Section 23 08 00 – Commissioning of HVAC Systems

1.3 EQUIPMENT AND SYSTEMS TO BE COMMISSIONED

- A. Commissioning will be performed for the following systems and equipment:
1. HVAC Systems and controls; including air and water side equipment.

1.4 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designations only.
1. ASHRAE Guideline 1.1 – HVAC&R Technical Process for the Commissioning Process (2007)
 2. ASHRAE Guideline 0 – The Commissioning Process (2005)
 3. ACG Commissioning Guideline – ACG Commissioning Guideline (2005)
 4. NEBB Commissioning Standard – Whole Building Technical Commissioning of New Construction (2019)
 5. SMACNA 1429 – HVAC Systems Commissioning Manual, 1st Edition (1994)
 6. ANSI/NETA – Standard For Electrical Commissioning of Electrical Power Equipment and Systems (2015)

1.5 DEFINITIONS & ABBREVIATIONS

- A. A/E: Architect/Engineer
- B. Acceptance Phase: Phase of construction after startup and initial checkout when Functional Performance Testing, O&M documentation review and training occurs.
- C. BAS: Building Automation System
- D. Basis of Design (BOD): The Engineer’s Basis of Design is comprised of two components: The Design Criteria and Design Narrative. These documents

record the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements and to satisfy applicable regulatory requirements, standards, and guidelines.

- E. CC: Controls Contractor
- F. Certificate of Readiness (COR): The COR is a document produced by the GC/CM and submitted to the CxA that states specifically indicated systems or equipment are complete installed, started-up, have undergone all testing and checkout and are ready to schedule FPTs.
- G. Commissioning Agent (CxA): An independent party, not otherwise associated with the A/E team members or the GC/CM oversees, though he/she may be hired as a subcontractor to them. The CxA directs the day-to-day commissioning activities.
- H. Commissioning Issue (Cx Issue): Any component or system condition (static or dynamic) that is in non-conformance with the contract documents, commissioning documents, performance requirements and/or industry standards and adversely affects the commissionability, operability, maintainability, or functionality of a system equipment or components.
- I. Commissioning Issues log: A formal and ongoing record of Commissioning Issues or concerns and their resolution that have been raised by members of the Commissioning Team during the commissioning process. Also known as the Corrective Action Log (CAL).
- J. Commissioning Plan (Cx Plan): An overall document that provides the structure, schedule and coordination planning for the commissioning process. The Cx Plan identifies the project's commissioning goals, commissioning team members and their roles; establishes the scope of commissioning in terms of systems and equipment; and outlines the major commissioning steps during design, construction, acceptance and occupancy phases. The Cx Plan outlines the expectation of the Contractor's organization, scheduling, allocation of resources, documentation, etc., pertaining to the overall commissioning process.
- K. Commissioning Final Report: The final document which presents the commissioning process results for the project. Commissioning reports include an executive summary, issues log, deferred our seasonal testing, and recommendation to accept the project.
- L. Commissioning Record: A compilation of all commissioning related documents produced as part of the project. This record includes but is not limited to final Cx documents, meeting minutes, start-up documents and

more. The Cx Record can be combined with the Cx Final Report or be provided as a stand-alone document.

- M. Commissioning Team (CT): The qualified group that will plan and carry out the overall commissioning process. The team is composed of the CxA, OR, A/E Team, GC/CM, Subs, equipment manufacturers and other parties identified by the CxA. The individual participants on the team may change as the design and construction process proceeds. Participation by the OR is not mandatory, but the value of this services to the customer is directly proportional to their participation.
- N. Construction Phase: Phase of construction that begins once construction commences and continues until TAB and Functional Performance Testing. This phase includes the commissioning submittal review, development and execution of Pre-Functional Checklists, site observations and equipment startup.
- O. Datalogging: Monitoring flows, currents, status, pressures, etc. of equipment using stand-alone data loggers separate from the control system.
- P. Deferred Testing: FPT's that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that prevent the test from being executed during the Acceptance Phase of the project.
- Q. EC: Electrical Contractor
- R. Functional Performance Test (FPT): Testing and documenting of the dynamic function and operation of equipment and systems to verify and demonstration operation in accordance with the OPR, BOD and contract documents. Using manual (direct observation) and/or monitoring methods, systems and equipment are tested under various conditions, such as low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's Sequences of Operation and components are verified to be responding as the sequences state. The CxA develops the FPT procedures in a sequential written form, coordinates, oversees, and documents the actual testing, which is usually performed by the installing contractor or vendor. FPT's are performed after Pre-Functional Checklists, startup, TAB and controls checkout are complete and the COR is received. The Subs are responsible for reviewing, understanding, and performing the FPT's.
- S. GC/CM: General Contractor / Construction Manager

- T. HVAC: Heating, Ventilating and Air Conditioning
- U. Indirect Indicators: Indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.
- V. Manual Test: Using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the “observation”).
- W. MC: Mechanical Contractor
- X. Monitoring: The recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or the trending capabilities of control systems.
- Y. O&M: Operation and Maintenance
- Z. Occupancy Phase: Phase of the project after the Acceptance Phase. During this phase, commissioning requirements are to correct any remaining Commissioning Issues, carry out any required re-testing, deferred or seasonal testing, close-out documentation review and warranty review.
- AA. Owner’s Project Requirements (OPR): A written document that details the project requirements and the expectations of the Owner for how the building and its systems must be used and operated. These include project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- BB. OR: Owner’s Representative
- CC. Over-written Value: Writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 50°F to 75°F to verify economizer operation). See also “Simulated Signal”.
- DD. PC: Plumbing Contractor
- EE. Pre-Functional Checklist (PFC): A list of items to inspect to verify proper installation of equipment and systems. PFCs are developed and provided by the CxA with execution being completed by the Subs, CxA or a combination thereof depending on the scope of services. PFCs are primarily static inspections and procedures to prepare the equipment or system for initial operations (e.g., belt tension, oil levels OK, labels affixed, gages in place, etc.).
- FF. Request for Information (RFI): An official document submitted to the A/E to provide clarity or direction on a specific question or issue that has arisen.

- GG. Sampling: Performing observation, review, testing or other verification on only a fraction of the total number of identical or near identical pieces of equipment, drawings, events, etc. Sampling techniques include random statistical sampling and less form professional judgment methods.
- HH. Seasonal Testing: FPTs that are deferred until the system(s) will experience conditions closer to their design conditions.
- II. Sequence of Operations (SOO): A written description of how equipment and systems are intended to operate. SOOs include control logic, setpoints, alarm requirements, trend requirements and other information necessary to properly program and commission the system. SOOs are developed by the EOR, and final versions are provided by the CC on the approved controls submittal.
- JJ. Simulated Condition: Condition that is created for the purpose of testing the response of a system.
- KK. Simulated Signal: Disconnecting a sensor and using a signal generator to send an amperage, resistance or pressure to the transducer and DDC system to simulate a sensor value.
- LL. Start-up: The initial starting or activating of dynamic equipment, including executing Pre-Functional checklists.
- MM. Subs: Subcontractors
- NN. TAB: Testing, Adjusting and Balancing
- OO. TABC: Testing, Adjusting and Balancing Contractor
- PP. Test Procedures: The step-by-step process which must be executed to fulfill the test requirements. The test procedures are developed by the CxA with assistance and coordination from GC/CM and Subs.
- QQ. Test Requirements: Requirements specifying what modes and functions, etc. shall be tested. The test procedures are not the detailed test procedures. The test requirements are specified in the Contract Documents.
- RR. Trending: Monitoring of BAS information by logging data at set intervals or when there is a change of value.

1.6 COMMISSIONING TEAM

- A. Commissioning requires the participation of all project team members to be an effective and efficient process. This team is made of individuals from the

Owner, Design and Construction teams as identified in this section. The commissioning team is fluid, and additional project team members may be added as needed throughout the project.

- B. Commissioning Team members appointed by Owner:
 - 1. CxA – Commissioning Agent
 - 2. OR – Owner's Representative, ideally member(s) of the O&M staff
 - 3. A/E – Architect and Engineering design professionals
- C. Commissioning Team members appointed by the Contractor(s):
 - 1. GC/CM – General Contractor/Construction Manager
 - 2. MC – Mechanical Contractor
 - 3. EC – Electrical Contractor
 - 4. PC – Plumbing Contractor
 - 5. CC – Controls Contractor
 - 6. TABC – TAB Contractor
 - 7. Equipment Suppliers and Vendors

1.7 COMMISSIONING SUBMITTALS

- A. This section identifies the commissioning submittals that the GC/CM and A/E are responsible for providing to the CxA for completion of commissioning related tasks.
- B. Construction Documents, RFIs, Sketches and other design documents:
 - 1. The A/E shall provide the CxA all current design documents. When contract document updates are issued, the CxA shall be included on the distribution of those documents.
 - 2. The CxA shall receive copies of all drawing updates that are not provided as part of official document updates, such as sketches.
 - 3. The GC/CM and A/E shall ensure the CxA receives copies of all RFIs related to commissioned systems. This includes both the original RFI

submitted to the A/E as well as any response provided. The CxA may provide input on RFIs to the A/E.

C. Construction Submittals:

1. The CxA will identify submittals to the GC/CM that are required concurrent with the submission to the A/E. The CxA's review shall be limited to the equipment being commissioned with the commissioning review focused on confirming compliance with the contract documents. The CxA will provide commissioning review comments to the A/E.
 - a. The CxA will only review the initial submittal for equipment being commissioned. All re-submittals shall be provided to the CxA, it shall be at the CxA's discretion to review any additional re-submittals.
2. The GC/CM shall provide final approved copies of the submittals to the CxA for development of project specific commissioning documentation.

D. Start-Up Plan:

1. The GC/CM, with assistance from the Subs and equipment vendors responsible for purchase, installation and start-up of equipment, shall develop a Start-Up Plan and executes equipment start-up utilizing the following procedure.
 - a. Compile detailed start-up and checkout procedures from equipment manufacturers and industry standard field checkout sheets. Start-up documentation shall include checklists and procedures with specific boxes or lines for recording and documenting inspections of each piece of equipment.
 - b. Submit the Start-Up Plan to the CxA for review in discipline specific books/sections which shall include the following at a minimum:
 - i. Cover sheet for each Start-Up Plan book/section. Each Start-Up Plan shall have an individual, discipline specific tag (e.g. Mechanical Start-Up Plan (Volume 1, 2, 3, etc.), Electrical Start-Up Plan, Plumbing Start-Up Plan, etc.).
 - ii. Table of Contents for each book/section.
 - iii. Schedule of start-up activities by equipment (initial Start-Up Plan submittal schedule shall be tentative; start-up schedule shall be updated as construction proceeds and forwarded

to CxA so that CxA can witness start-up activities as required).

- iv. Separate tagged divider by specification section with all related systems testing documentation (duct pressure testing, duct cleaning, piping flushing and pressure testing, electrical acceptance testing, etc.).
 - v. Separate tagged divider by specification section with start-up checklists and documentation for each item of equipment.
2. The CxA, A/E and OR reviews the Start-Up Plan for content and format. The CxA shall return the Start-Up Plan with comments to GC/CM and the GC/CM shall revise the Start-Up Plan based on CxA comments.
 3. The GC/CM shall forward copies of completed Start-Up Plan sections as the work is completed, including all executed start-up checklists, to CxA for review to verify completion of start-up activities. An executed Start-Up Plan must be submitted to CxA prior to scheduling of FPTs.
 4. Once all start-up activities are complete, the GC/CM shall submit a complete, compiled Start-Up plan for documentation. Any comments made by the CxA on individual section submissions shall be incorporated.

E. CORs:

1. The GC/CM shall submit completed CORs to the CxA for each piece of equipment or system prior to scheduling and execution of FPTs.
2. At a minimum, COR must confirm and certify that the following:
 - a. All previously identified Cx Issues for the related equipment/system have been resolved and verified.
 - b. Start-up and checkout activities have been completed successfully and all documents have been submitted to the CxA.
 - c. TAB is complete and all documentation has been submitted to the CxA.
 - d. Controls programming is complete and operational, including graphical user interface, trending, alarming, scheduling and other systems necessary for a complete BAS.

- e. Subs and/or manufacturers' representatives will be made available as necessary for the execution of FPTs.
3. Each COR shall include the following for both the GC and associated Subs:
- a. Printed Name
 - b. Title
 - c. Company
 - d. Signature
 - e. Date
4. Sample COR templates can be provided by the CxA.
- F. Turnover Documents:
1. The GC/CM shall provide the following turnover documents to the CxA for review:
- a. As-Built Drawings, including final controls SOOs and Setpoints.
 - b. O&M Manuals
 - c. Owner Training Documents

PART 2 PRODUCTS

2.1 TEST EQUIPMENT

- A. All testing equipment required to perform startup and initial checkout and required FPTs shall be provided by the GC/CM, Subs or equipment vendors for the equipment being tested.
- B. Special equipment, tools, and instruments (only available from vendor, specific to a piece of equipment) required for testing or maintaining equipment shall be included in the base bid price to the GC/CM and shall be left on site for use by the Owner's O&M staff.
- C. Test equipment shall be of sufficient quality and accuracy to test and/or measure system performance with tolerances specified. A testing laboratory shall have calibrated test equipment within the previous 12 months.

Calibration shall be NIST traceable. Equipment shall be calibrated according to manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

- D. Reference discipline specific specification sections for additional test equipment requirements.

PART 3 EXECUTION

3.1 COMMISSIONING PROCESS OVERVIEW

- A. The following provides a brief overview of the commissioning tasks during the construction, acceptance, and occupancy phases and are listed in the approximate order in which they occur:
 1. Submittals for commissioned systems and equipment are provided to the CxA by the GC/CM concurrent to the A/E as part of the normal submittal process.
 2. Final approved submittals are forwarded to the CxA by the GC/CM or Subs for use by the CxA during the commissioning process.
 3. The CxA develops equipment specific PFCs.
 4. Prior to executing onsite work, the CxA will organize and lead a Commissioning Kick-Off meeting. This meeting involves the entire CT and provides a thorough review of the upcoming commissioning tasks, discusses roles and responsibilities and answers any commissioning related questions.
 5. The CxA ensures all PFCs are completed prior to equipment start-up and execution of FPTs.
 6. The CxA develops project specific FPT plans. These plans are created by using both the contract documents and approved submittals. FPT plans are provided to the GC/CM, Subs, A/E and OR for review and comment.
 7. The GC/CM coordinates and executes equipment startup and checkout activities.
 8. TAB is executed and documentation is submitted according to the contract documents.
 9. The GC/CM submits CORs to the CxA to indicate systems and equipment are ready to begin executing FPTs.
 10. The CxA coordinates the execution of the FPTs with the assistance of the Subs.

11. Owner Training is completed by the GC/CM in accordance with the contract documents.
12. The CxA issues the Cx Final Report and Cx Record. These documents may be a single file.

3.2 ROLES AND RESPONSIBILITIES

- A. The general responsibilities of various commissioning team members are provided in this subsection. Specific responsibilities will be provided in the Cx Plan.
- B. OR's Responsibilities:
 1. Develop and provide the approved OPR to the CxA, A/E and GC/CM for information and use.
 2. Update the OPR as necessary throughout the project.
 3. Facilitate, support and participate in the commissioning process.
 4. Provide final approval of the commissioning work.
- C. Architect/Engineer Responsibilities:
 1. Develop and provide the OR Approved BOD document to the CxA.
 2. Attend selected commissioning meetings as needed or requested by the CxA.
 3. Provide copies of all design documents including all drawings, specifications and revisions to those documents, sketches, RFIs or other documents that modify the project design.
 4. Review and respond to any Design Review Comments. Incorporate any necessary changes in future drawing releases.
 5. Review CxA Submittal Review comments. Any comments deemed valuable shall be incorporated into official submittal responses by the A/E. Any comments that are not included shall be provided written responses from the A/E detailing why for record purposes.
 6. Participate in the resolution of Commissioning Issues identified during the project as needed or requested by the CxA.
 7. Review and comment on FPT plans developed by the CxA to ensure compliance with the design intent of the system and equipment.
 8. Review and approval all final Cx Documents produced the CT members.

D. General Contractor/Construction Manager Responsibilities:

1. Incorporate commissioning activities and milestones into the overall project schedule. Provide updates as necessary.
2. Ensure all Subs and equipment vendors fully participate in the commissioning process and execute their responsibilities.
3. Attend, along with all necessary Subs, commissioning progress and coordination meetings.
4. Provide the CxA copies of all OAC meeting minutes, RFIs and other construction progress or change related documents.
5. Notify the CxA when equipment is ready for observation, PFC and FPT completion.
6. Coordinate with the CxA regarding planning, scheduling and execution of all startup and testing activities. Submit all plans, reports and completed forms to the CxA and A/E for review and approval.
7. Coordinate with appropriate Subs and vendors to ensure timely resolutions to commissioning issues.
8. Review and comment on the FPT plans developed by the CxA.
9. Ensure Subs provide technicians, equipment or other tools requested by the CxA in order to complete commissioning activities including but not limited to the execution of FPTs.
10. Submit CORs to the CxA prior to scheduling FPTs.
11. Compile and submit all closeout and turnover documents to the A/E and CxA for review and approval including but not limited to As-Built drawings and O&M Manuals.
12. Coordinate and execute Owner Training in accordance with the contract documents, specifically section 01 79 00 Minimum Owner Training Requirements.

E. Commissioning Agent's Responsibilities:

1. Organize and lead the Commissioning Team in the execution of all commissioning activities.
2. Develop the Commissioning Plan and Commissioning Specifications that clearly define the commissioning process and team member roles and responsibilities and provide sample documentation.
3. Review the contract documents for constructability, commissionability and maintainability.

4. Review submittal documents for conformance with the contract documents for commissioned systems and equipment.
5. Develop equipment specific Pre-Functional Checklists and project specific Functional Performance Test scripts.
6. Plan and lead commissioning related meetings as necessary to coordinate commissioning tasks and discuss commissioning issues.
7. Conduct periodic site visits to execute PFCs, review progress of installation and document Commissioning Issues.
8. Develop and maintain the Cx Issues Log to track all identified Cx Issues, resolutions and commentary from the GC/CM, Subs, OR and A/E.
9. Provide regular reports on progress of the commissioning activities, including any currently unresolved Commissioning Issues.
10. Review acceptance, testing and other reports generated by the GC/CM and Subs.
11. Verify that TAB work is completed properly by reviewing the TAB report and performing limited verification with the assistance of the TABC.
12. Develop and issue the Cx Final Report. The Cx Record may be included as part of the Cx Final Report or be issued as a separate document.
13. Recommend acceptance of the commissioned equipment and systems to the OR.
14. Direct and witness any seasonal or deferred FPTs that could not be completed during the acceptance phase FPT period.
15. Plan and conduct a project close-out and lessons learned meeting with the OR, GC/CM and A/E.

3.3 SCHEDULING AND COORDINATION

- A. Kick-off Meeting: Prior to beginning onsite work the CxA will plan, schedule and conduct a commissioning kick-off meeting. Roles and responsibilities of the Commissioning Team will be clarified at this meeting along with a review of the Cx Plan. The CxA will distribute meeting minutes to all parties.
- B. The CxA will work with GC/CM to established protocols to schedule the commissioning activities. The CxA will review the Construction Schedule and verify that PFCs and FPTs are properly scheduled. The GC/CM will integrate all commissioning activities into the master schedule.
- C. The GC/CM shall notify the CxA of any changes in the construction schedules that will affect commissioning activities. The CxA will work with the GC/CM and

Sub(s) to schedule new dates as necessary. The GC/CM shall notify the CxA a minimum of five (5) days in advance of scheduled commissioning visits if re-scheduling is required.

1. Any time for the CxA to visit the site to execute commissioning tasks on equipment or systems that were identified as being ready by the GC/CM but found to not be will be back charged to the GC/CM at a cost of \$2,500 plus expenses per man-day.
- D. The GC/CM and Sub(s) shall schedule their representatives as required by the CxA to complete all commissioning activities.

3.4 PRE-FUNCTIONAL CHECKLISTS

A. Objectives and Scope:

1. The objective of PFCs is to verify and document that the equipment/systems are provided and installed according to the contract documents, manufacturers recommendations and industry standards. Each piece of commissioned equipment shall receive a PFC that must be completed and approved prior to start-up.

B. Development of Documents:

1. The CxA is responsible for developing equipment specific PFCs for each piece of commissioned equipment. No equipment shall share completed PFC documents.
2. Sample PFCs are provided in the Cx Plan and can be obtained from the CxA. The samples are provided to give the Subs a general idea of the content and scope of the PFC process. The sample PFCs are prototypical, and do not reflect specific requirements of this project's plans or specifications.

C. Execution:

1. The CxA is responsible for executing and completing all PFC documentation concurrent with construction progress. Only individuals who have witnessed and reviewed the installation may complete checklist lines. Checklists may only be completed onsite while physically at the piece of equipment – no completion of checklists from offices or jobsite trailers is allowed.
2. Any PFC item or associated Cx Issue marked as complete which is later found to be incomplete and causes re-verification work by CxA or delays during FPTs will be back- charged to the responsible party.

3.5 START-UP AND INITIAL CHECKOUT

- A. The GC/CM shall develop the Start-Up Plan and submit to the CxA, A/E, and OR for approval a minimum of thirty (30) days prior to the anticipated start of start-up activities.
- B. After receiving approval of the Start-Up Plan, the GC/CM shall organize and lead a Start-Up Coordination Meeting. All CT members shall attend and provide feedback on start-up activities.
- C. Subs and/or equipment vendors shall execute equipment start-up per the Start-Up Plan.
- D. The GC/CM shall provide the CxA with signed and dated copy of completed Start-Up Plan documents prior to scheduling of FPTs. Only individuals having direct knowledge that a line item task was actually performed shall complete the documentation.
- E. Subs shall clearly list outstanding items or initial start-up tests that are not completed successfully. Completed forms documenting any outstanding deficiencies shall be provided to CxA within two (2) working days of completion.

3.6 FUNCTIONAL PERFORMANCE TESTS

- A. Objective and Scope:
 - 1. The purpose of FPTs is to document and verify that all equipment and systems are operating according to the design intent and as defined in the contract documents and approved submittals. The process of FPTs facility bringing a system from a state of substantial completion to fully dynamic operation.
 - 2. Each component and system are operated through all modes of operation (occupied, unoccupied, etc.) where specific equipment and system responses are required. All control SOOs are tested and verified, including all safeties and alarms.
 - 3. FPTs are only performed on dynamic pieces of equipment. Static system components (i.e. panelboards, louvers, etc.) do not undergo FPTs.
- B. Development of Documents:
 - 1. The CxA will develop project specific test procedures and forms to verify and document equipment and system operation. These test procedures are developed from a combination of the contract documents and approved submittals.
 - a. The GC/CM shall provide all documents requested by the CxA for

the development of FPT test procedures.

- b. The GC/CM shall authorize the Subs and equipment vendors to assist the CxA in development of the test procedures as requested by the CxA.
2. Once developed, the CxA will issue the FPT test procedures to the CT for review and comment. It is imperative that all members thoroughly review these procedures for feasibility, safety, and warranty protection as well as conformance to the design intent. If necessary, the CxA will coordinate a meeting to discuss any concerns. Based on CT feedback, the CxA will make any necessary updates to the FPT test procedures.
 - a. Failure to properly review FPT test procedures and identify any feasibility or other issues by the GC/CM, Subs or equipment vendors during the review period that are identified during test execution will be handled as non-conformance Cx Issues.

C. Execution:

1. Prior to scheduling FPT execution, complete CORs must be received by the CxA and all associated documentation. All start-up, checkout, TAB and other testing must be complete and final prior to FPTs.
2. The GC/CM shall provide the CxA a minimum of fourteen (14) days' notice for when FPTs may begin.
3. The CxA will conduct an FPT coordination meeting with the CT. This meeting will serve to schedule the execution of FPTs, answer any questions and remind each CT member of their roles and responsibilities.
4. The GC/CM shall ensure that the Subs and/or equipment vendors provide trained technicians familiar with the project to assist in the execution of FPTs.
5. The Subs and/or equipment vendor technicians will execute the FPT test procedures. The CxA will direct and document the results of the FPT.
6. FPTs will be completed under design conditions whenever possible. Simulated conditions or signals may be used when not practical under design conditions as the discretion and direction of the CxA. The CxA will determine how to best simulate the conditions needed for the test.
7. If any line of an FPT test procedure is unsuccessful or fails, that line item and/or test section will be deemed to be in non-conformance and identified as a Commissioning Issue.
8. When an FPT is completed and any identified Commissioning Issues are resolved, the CxA, GC/CM, Subs and/or equipment vendor shall sign off that testing is complete and successful, and the equipment is ready to be turned over to the Owner.

D. Deferred Testing:

1. If any FPT cannot be completed due an unforeseen condition outside the control of the GC/CM or CxA, execution shall be deferred based on the recommendation of the CxA and approval of the OR. The affected testing shall be completed as soon as practical.
2. Costs associated with deferred testing are the responsibility of the GC/CM, Subs and equipment vendors. Deferred tests are tests that have not been performed, therefor any costs associated with those tests have not been utilized.

E. Seasonal Testing:

1. Seasonal testing are FPTs that are executed during the opposite season of the initial FPTs. The intent of seasonal testing is to verify equipment operation during both weather extremes.
2. Seasonal testing shall be executed during ASHRAE design condition months. If possible, scheduling should be flexible to coordinate testing on days as close to design condition as possible.
3. The GC/CM shall ensure participation by the Subs and/or equipment vendors. The same technician made available during the initial FPTs shall be made available for seasonal testing.
4. Costs associated with seasonal testing shall be covered by the CxA, Subs and equipment vendors for their respective resources.

3.7 NON-CONFORMANCE AND COMMISSIONING ISSUES

- A. The CxA will document any observations, installation issues or operational non-conformance issues as Commissioning Issues and be tracked in the Commissioning Issues Log.
- B. All Commissioning Issues identified prior to the execution of FPTs must be resolved by the GC/CM and Subs and verified by the CxA prior to scheduling FPTs.
- C. Non-conformance Commissioning Issues identified during the execution of FPTs must be completed prior to release of the GC/CM and Subs retainage.
- D. Commissioning Issues will be handled in the following manner:
 1. When there is no dispute on the Cx Issue and Subs accept responsibility for remedial action:
 - a. The CxA documents the Cx Issue in the Cx Issues Log and distributes to the CT.

- b. The GC/CM facilitates the resolution of the issue and assigns Cx Issues to the appropriate Subs and equipment vendors.
 - c. Subs and equipment vendors make necessary modifications and submit written response to GC/CM stating necessary changes have been made. GC/CM reviews the work and forwards the response to the CxA if they agree that the Cx Issue is resolved.
 - d. The CxA verifies the resolution is satisfactory and indicates the Cx Issue as corrected.
2. When there is a dispute about the Cx Issue regarding whether the issue is valid or who is responsible:
- a. The CxA documents the Cx Issue in the Cx Issues Log and distributes to the CT.
 - b. The GC/CM facilitates the resolution of the issue. If assistance is needed, additional parties may be brought into the discussions, including the CxA. Final interpretive authority is with the A/E. Final acceptance authority is with the OR.
 - c. The CxA documents the final interpretation and resolution process.
 - d. If Subs and equipment vendors are to make necessary modifications and submit written response to GC/CM stating necessary changes have been made. GC/CM reviews the work and forwards the response to the CxA if they agree that the Cx Issue is resolved.
 - e. The CxA verifies the resolution is satisfactory and indicates the Cx Issue as Corrected.
 - f. If the A/E or OR are going to accept the Cx Issue as is, the Cx Issues Log shall be updated to indicate the issue as Accepted.
- E. Costs associated with verification or re-testing of Cx Issues:
- 1. Costs Subs or equipment vendors to re-verify Cx Issues identified during the project, if they are responsible for the issue, will be theirs.
 - 2. If Subs are not responsible for a Cx Issue but are required for verification or re-testing, cost recovery may be negotiated with the GC/CM.
 - 3. Time for the CxA to conduct verification of Cx Issue resolutions or re-testing due to Cx Issues being reported as resolved but found to not be will be back charged to the responsible Subs at a cost of \$2,500 plus expenses per man-day.

3.8 OWNER TRAINING

- A. The GC/CM is responsible for execution of Owner Training as outlined within the various spec sections.

END OF SECTION 01 91 13

**SECTION 01 2100
CASH ALLOWANCES**

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Cash Allowances

1.02 CASH ALLOWANCES

- A. Contractor Responsibilities:
 - 1. Assist Architect in selection of products, suppliers, and installers.
 - 2. Obtain proposals from suppliers and installers and offer recommendations.
 - 3. On notification for which products have been selected, execute purchase agreement with designated supplier and installer.
 - 4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
 - 5. Promptly inspect products upon delivery for completeness, damage and defects. Submit claims for transportation damage.
 - 6. Provide full labor / material breakdowns for all scope associated with allowances.

1.03 CASH ALLOWANCES SCHEDULE

- A. Allowance #1 – Allow \$10,000 for structural framing associated with the return duct opening through the mechanical room floor above AH-6. The structural framing shall be similar to the openings provided for RTU-1 and RTU-2, and further guidance will be issued via ASI post-bid.
- B. Allowance #2 – Allow \$50,000 for scope associated with Keyed Note #3, Sheets ED1.1, ED1.2, and ED1.3. Contractor / Owner / Engineer shall review scope once corridor ceilings are completely removed and prior to work associated to Allowance #2 commencing.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

END OF SECTION

**SECTION 23 0923
DIRECT DIGITAL CONTROL SYSTEM FOR HVAC**

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of these Specifications and will be used in conjunction with this Section as a part of the Contract Documents.

1.02 DESCRIPTION

- A. General: The control system will be as indicated on the drawings and described in the specifications. The campus automation system shall connect to BACnet interfaces to perform monitoring and start/stop functions as outlined in control drawings.
- B. The Direct Digital Control System (DDCS) will be designed such that each mechanical system will be able to operate under stand-alone control. In the event of a network communication failure, or the loss of any other controller, the control system will continue to independently operate under control.

1.03 QUALITY ASSURANCE

- A. System Vendor Qualifications - The controls vendor shall be Alerton or Schneider Electric.
- B. Codes and Standards: Meet requirements of all applicable standards and codes, except when more detailed or stringent requirements are indicated by the Contract Documents, including requirements of this Section.
 - 1. Underwriters Laboratories: Products will be UL-916-PAZX listed.
 - 2. National Electrical Code -- NFPA 70.
 - 3. Federal Communications Commission -- Part J.
 - 4. ASHRAE/ANSI 135 (BACnet)

1.04 SUBMITTALS

- A. Contractor will provide shop drawings and manufacturers= standard specification data sheets on all hardware and software to be provided.
 - 1. Project Record Drawings - As built version of the submittal shop drawings.
 - 2. Testing and Commissioning Reports and Checklists.
 - 3. Operating and Maintenance (O & M) Manual - These will be as-built versions of the submittal product data.

1.05 WARRANTY

- A. Labor & materials for control system specified will be warranted free from defects for a period of twelve (12) months after final completion acceptance by the Owner. Control System failures during the warranty period will be adjusted, repaired, or replaced at no charge or reduction in service to the Owner.

PART 2 PRODUCTS

2.01 BUILDING CONTROLLERS

- A. General - The Building Automation System will be composed of one or more independent, stand-alone, microprocessor-based Building Controllers to manage the global strategies described in System software section. Data will be shared between networked Building Controllers.
 - 1. The controller will provide a communications port for connection to existing network.
 - 3. The building controller shall include an operator interface for access to all functions defined in section 2.03.
- B. Memory. The Building Controller will maintain all BIOS and programming information in the event of a power loss for at least 72 hours.
- C. All building / global controllers shall be capable of operating standalone operation in case of loss of communications.

2.02 CUSTOM APPLICATION CONTROLLERS

- A. General - The Building Automation System will be composed of one or more independent, stand-alone, microprocessor-based Building Controllers to manage the local strategies described in System software section. Data will be shared between networked Controllers. The operating system of the Controller will manage the input and output communications signals to allow distributed controllers to share real and virtual point information and allow central monitoring and alarms.
 - 1. Controller hardware will be suitable for the anticipated ambient conditions. Controllers used outdoors and/or in wet ambient will be mounted within NEMA Type 4 waterproof enclosures, and will be rated for operation at -40 F to 150 F. Controller used in conditioned ambient will be mounted in dust-proof enclosures, and will be rated for operation at 32 F to 120 F.
 - 2. Provide RS-232 connection for access to handler controller. Configure database so that HVAC technician may scroll through current status of all inputs and outputs and access local control of outputs for trouble shooting purposes. Provide password protection for all command procedures.
- B. All field / unit controllers shall be capable of operating standalone operation in case of loss of communications.

2.03 APPLICATION SPECIFIC CONTROLLERS

- A. General – Terminal Equipment Controllers (TEC) are microprocessor-based DDC controllers which through hardware or firmware design are dedicated to control a specific piece of equipment. They are not fully user programmable, but are customized for operation within the confines of the equipment they are designed to serve. Each TEC will be capable of stand-alone operation and will continue to provide control functions without being connected to the network.
- B. Environment - Controllers used outdoors and/or in wet ambient will be mounted within NEMA Type 4 waterproof enclosures, and will be rated for operation at -40 F to 150 F. Controller used in conditioned ambient will be mounted in dust-proof enclosures, and will be rated for operation at 32 F to 120 F.

2.04 COMMUNICATIONS

- A. The design of the BMS shall support networking of operator workstations and Building Controllers. The network architecture shall consist of two levels, an Ethernet based primary network for all operator workstations, servers, and primary DDC controllers along with secondary Floor Level Networks (FLN) for terminal equipment application specific controllers.
- B. Access to system data shall not be restricted by the hardware configuration of the building management system. The hardware configuration of the BMS network shall be totally transparent to the user when accessing data or developing control programs.
- C. Remote operator interface for communication with any and all controllers on this network. Communications services over the internetwork will result in operator interface and value passing that is transparent to the internetwork architecture.
- D. The time clocks in all controllers will be automatically synchronized daily.

2.05 AUXILIARY CONTROL DEVICES

- A. Motorized dampers, unless otherwise specified elsewhere, will be as follows:
 - 1. Damper frames will be 16-gauge galvanized sheet metal or 1/8-inch extruded aluminum with reinforced corner bracing.
 - 2. Damper blades will not exceed 8 inches in width or 48 inches in length. Blades are to be suitable for medium velocity performance (2,000 fpm). Blades will be not less than 16 gauge.
 - 3. Damper shaft bearings will be as recommended by manufacturer for application.
 - 4. All blade edges and top and bottom of the frame will be provided with compressible seals. Side seals will be compressible stainless steel. The blade seals will provide for a maximum leakage rate of 10 CFM per square foot at 2.5" w.c. differential pressure.
 - 5. All leakage testing and pressure ratings will be based on AMCA Publication 500.
 - 6. Individual damper sections will not be larger than 48" x 60". Provide a minimum of one damper actuator per section.
- B. Control dampers will be parallel or opposed blade type as scheduled on drawings.
- C. Electronic damper actuators.
 - 1. The actuator will have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator.
 - 2. Where indicated on the drawings or in the Sequence of Operations, for power-failure/safety applications, an internal mechanical, spring return mechanism will be built into the actuator housing.
 - 3. All rotary spring return actuators will be capable of both clockwise or counter clockwise spring return operation. Linear actuators will spring return to the retracted position.
 - 4. Proportional actuators will accept a 0-10 VDC or 0-20 ma control signal and provide a 2-10 VDC or 4-20 ma operating range.
 - 5. All 24 VAC/DC actuators will operate on Class 2 wiring and will not require more than 10 VA for AC or more than 8 W for DC applications. Actuators operating on 120 VAC or 230 VAC will not require more than 11 VA.
 - 6. All field installed non-spring return actuators will have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring return actuators with more than 60 in-lb. torque capacity will

- have a manual crank for this purpose.
7. All field installed modulating actuators will have an external, built-in switch to allow the reversing of direction of rotation.
 8. All field installed actuators will be provided with a conduit fitting and a minimum 1m electrical cable and will be pre-wired to eliminate the necessity of opening the actuator housing to make electrical connections.
 9. All field installed actuators will be Underwriters Laboratories Standard 873 listed.
 10. Actuators will be designed for a minimum of 60,000 full stroke cycles at the actuator's rated torque.
- D. Temperature Sensors:
1. Temperature sensors will be Resistance Temperature Device (RTD) or Thermistor.
 2. Duct sensors in supply and return air will be rigid. Mixing sensors will be an averaging type with a minimum of 22 feet of length.
 3. Immersion sensors will be provided with a separable stainless steel well. Pressure rating of well is to be consistent with the system pressure in which it is to be installed.
 4. Space sensors will be equipped with set-point adjustment, and override switch as indicated in the sequence of operation.
- E. Humidity Sensors:
1. Duct and room sensors will have a sensing range of 20% to 80% with accuracy of "5% RH
 2. Duct sensors will be provided with a sampling chamber.
 3. Outdoor air humidity sensors will have a sensing range of 20% to 95% RH It will be suitable for ambient conditions of -40 F to 170 F.
 4. Humidity sensor's drift will not exceed 1% of full scale per year.
- F. Static Pressure Sensors:
1. Sensor will have linear output signal. Zero and span will be field-adjustable.
 2. Sensor sensing elements will withstand continuous operating conditions plus or minus 50% greater than calibrated span without damage.
- G. Low Limit Thermostats:
1. Safety low limit thermostats will be vapor pressure type with an element 20 ft minimum length. Element will respond to the lowest temperature sensed by any one-foot section.
 2. Low limit will be manual reset only. Low Limit will shut down unit through starter regardless of position of hand-off-auto switch. Low limit will also provide indication to the air handler controller for alarming through the DDCS.
- H. Relays:
1. Control relays will be UL listed plug-in type with dust cover unless mounted in an enclosure. Contact rating, configuration, and coil voltage suitable for application.
 2. Time delay relays will be UL listed solid-state plug-in type with adjustable time delay. Delay will be adjustable plus or minus 200% (minimum) from set-point shown on plans. Contact rating, configuration, and coil voltage suitable for application. Provide NEMA 1 Type enclosure when not installed in local control panel.
- I. Transformers and Power Supplies:
1. Control transformers will be UL listed, Class 2 current-limiting type, or will be furnished with over-current protection in both primary and secondary circuits for Class 2 service.

2. Unit output will match the required output current and voltage requirements. Current output will allow for a 50% safety factor. Output ripple will be 3.0 mV maximum Peak-to-Peak. Regulation will be 0.10% line and load combined, with 50 microsecond response time for 50% load changes. Unit will have built-in over-voltage protection.
- J. Current Switches:
1. Current-operated switches will be self-powered, solid state with adjustable trip current. The switches will be selected to match the current of the application and output requirements of the DDC system.
- K. Local Control Panels:
1. All indoor control cabinets will be fully enclosed NEMA 1 Type construction with key-lock latch, removable sub-panels.
 2. Interconnections between internal and face-mounted devices pre-wired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections will be UL listed for 600-volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring. Control terminations for field connection will be individually identified per control drawings.

2.05 APPROVED PRODUCT LINES

- A. Building / Global Controller
1. Schneider Electric: AS-P / ASB (BACnet IP)
 2. Alerton: ACM (BACnet MS/TP)
- B. Field / Unit Controller
1. Schneider Electric: MPC / RPC (BACnet IP) or MNB (BACnet MS/TP)
 2. Alerton: VIP363 with Expanders (BACnet MS/TP)
- C. VAV Terminal Controller
1. Schneider Electric: MPV (BACnet IP) or SE8000 (BACnet MS/TP)
 2. Alerton: VAVSD2A (BACnet MS/TP)

PART 3 EXECUTION

3.01 INSTALLATION REQUIREMENTS

- A. All electrical work, including but not limited to installation of conduit, performed in the installation of the DDCS/ATC system as described in this specification will be per the National Electrical Code (NEC) and per applicable state and local codes. Where exposed, conduit will be run parallel to building lines properly supported and sized at a maximum of 40% fill.
- B. In no cases will field installed conduit smaller than 3/4" trade size be allowed. Where conductors are concealed (tenant spaces), cable rated for use in return air plenums will be used and properly supported from J-hooks. All conduit shall be installed per Division 26.
- C. Follow manufacturer's instructions for interlocking unit controls to campus automation system.
- D. All field IP cabling shall be CAT6.

- E. All IP / MS/TP routers shall be securely mounted in accessible panels.
- F. Enclosed panels / control boxes shall be provided for all unit controllers.
- G. RSTP topology shall be provided for field IP controllers.
- H. All managed switches shall be panel mountable and provided with an enclosed panel.

3.02 SEQUENCE OF OPERATIONS – REFER TO DRAWINGS

END OF SECTION

Snow Fine

CARLISLE

GOLDEN SEAL TOTAL ROOFING SYSTEM WARRANTY

with limited coverage for hail and accidental punctures

SERIAL NO. 10172771

925

DATE OF ISSUE: November 19, 2018

BUILDING OWNER: UNIVERSITY OF CENTRAL ARKANSAS
NAME OF BUILDING: SNOW FINE ARTS CENTER
BUILDING ADDRESS: MARIAN ROSS DRIVE, CONWAY, AR

DATE OF COMPLETION OF THE CARLISLE TOTAL ROOFING SYSTEM: 10/12/2018

DATE OF ACCEPTANCE BY CARLISLE: 11/19/2018

CMD1244654

Carlisle Roofing Systems, Inc., (Carlisle) warrants to the Building Owner (OWNER) of the above described building, that; subject to the terms, conditions and limitations stated in this warranty, Carlisle will repair any leak in the Carlisle Golden Seal™ Total Roofing System (CARLISLE TOTAL ROOFING SYSTEM) installed by a Carlisle Authorized Roofing applicator for a period of 20 years commencing with the date of Carlisle's acceptance of the Carlisle Total Roofing System installation. However, in no event shall Carlisle's obligations extend beyond 20.5 years subsequent to the date of substantial completion of the Carlisle Total Roofing System. See below for exact date of warranty expiration.

The Carlisle Total Roofing System is defined as the following Carlisle brand materials: Membrane, Flashings, Adhesives and Sealants, Insulation, Cover Boards, Fasteners, Fastener Plates, Fastening Bars, insulation adhesives and any other Carlisle brand products utilized in this installation.

TERMS, CONDITIONS, LIMITATIONS

- Owner shall provide Carlisle with written notice via letter, fax or email within thirty (30) days of the discovery of any leak in the Carlisle Total Roofing System. Owner should send written notice of a leak to Carlisle's Warranty Services Department at the address set forth at the bottom of this warranty. By so notifying Carlisle, the Owner authorizes Carlisle or its designee to investigate the cause of the leak. Should the investigation reveal the cause of the leak to be outside the scope of this Warranty, investigation and repair costs for this service shall be paid by the Owner.
- If, upon inspection, Carlisle determines that the leak is caused by a defect in the Carlisle Total Roofing System's materials, or workmanship of the Carlisle Authorized Roofing Applicator in installing the same, Owner's remedies and Carlisle's liability shall be limited to Carlisle's repair of the leak.
- This warranty shall not be applicable if, upon Carlisle's inspection, Carlisle determines that any of the following has occurred:
 - The Carlisle Total Roofing System is damaged by natural disasters, including, but not limited to, lightning, fire, insect infestations, earthquake, tornado, hurricanes, winds of (3 second) peak gust speeds of fifty-five mph or higher measured at 10 meters above ground, and hail greater than 3 inches in diameter (as reported by the National Climatic Data Center). Carlisle shall not be responsible for any changes in appearance or surface imperfections caused by hail incidents.
 - Loss of integrity of the building envelope and, or structure including, but not limited to partial or complete loss of roof decking, wall siding, windows, doors or other envelope components or from roof damage by wind-blown objects, or:
 - The Carlisle Total Roofing System is damaged by any intentional or negligent acts, accidents, misuse, abuse, vandalism, civil disobedience, or the like; however, this warranty does provide limited coverage to provide for the repair of any leaks in the Carlisle Total Roofing System caused by accidental punctures (but not including punctures caused by snow removal or other trades during new construction). The extent of this limited warranty to repair punctures shall not exceed 16 man hours per year during the life of the warranty.
 - Deterioration or failure of building components, including, but not limited to, the roof substrate, walls, mortar, HVAC units, non-Carlisle brand metal work, etc., occurs and causes a leak, or otherwise damages the Carlisle Total Roofing System; or
 - Acids, oils, harmful chemicals and the like come in contact with the Carlisle Total Roofing System and cause a leak, or otherwise damage the Carlisle Total Roofing System.
 - The Carlisle Total Roofing System encounters leaks or is otherwise damaged by condensation resulting from any condition within the building that may generate moisture.
- This Warranty shall be null and void if any of the following shall occur:
 - If, after installation of the Carlisle Total Roofing System by a Carlisle Authorized Roofing Applicator there are any alterations or repairs made on or through the roof or objects such as, but not limited to, structures, fixtures, solar panels, wind turbines, roof gardens or utilities are placed upon or attached to the roof without first obtaining written authorization from Carlisle; or
 - Failure by the Owner to use reasonable care in maintaining the roof, said maintenance to include, but not be limited to, those items listed on Carlisle's Care & Maintenance Information sheet which accompanies this Warranty.
- Only Carlisle brand insulation products are covered by this warranty. Carlisle specifically disclaims liability, under any theory of law, for damages sustained by or caused by non-Carlisle brand insulation products.
- During the term of this Warranty, Carlisle shall have free access to the roof during regular business hours.
- Carlisle shall have no obligation under this Warranty while any bills for installation, supplies, service, and warranty charges have not been paid in full to the Carlisle Authorized Roofing Applicator, Carlisle, or material suppliers.
- Carlisle's failure at any time to enforce any of the terms or conditions stated herein shall not be construed to be a waiver of such provision.
- Carlisle shall not be responsible for the cleanliness or discoloration of the Carlisle Total Roofing System caused by environmental conditions including, but not limited to, dirt, pollutants, or biological agents.
- Carlisle shall have no liability under any theory of law for any claims, repairs, restoration, or other damages including, but not limited to, consequential or incidental damages relating, directly or indirectly, to the presence of any irritants, contaminants, vapors, fumes, molds, fungi, bacteria, spores, mycotoxins, or the like in the building or in the air, land, or water serving the building.
- This warranty shall be transferable upon a change in ownership of the building when the owner has completed certain procedures including a transfer fee and an inspection of the Roofing System by a Carlisle representative.

CARLISLE DOES NOT WARRANT PRODUCTS UTILIZED IN THIS INSTALLATION WHICH IT HAS NOT FURNISHED; AND SPECIFICALLY DISCLAIMS LIABILITY, UNDER ANY THEORY OF LAW, ARISING OUT OF THE INSTALLATION AND PERFORMANCE OF, OR DAMAGES SUSTAINED BY OR CAUSED BY, PRODUCTS NOT FURNISHED BY CARLISLE OR THE PRIOR EXISTING ROOFING MATERIAL OVER WHICH THE CARLISLE TOTAL ROOFING SYSTEM WAS BEEN INSTALLED.

THE REMEDIES STATED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES FOR FAILURE OF THE CARLISLE TOTAL ROOFING SYSTEM OR ITS COMPONENTS. THERE ARE NO WARRANTIES EITHER EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY, WHICH EXTEND BEYOND THE FACE HEREOF. CARLISLE SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR OTHER DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR DAMAGE TO THE BUILDING OR ITS CONTENTS UNDER ANY THEORY OF LAW.

By: Mark J. Long

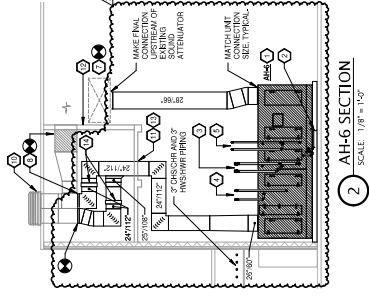
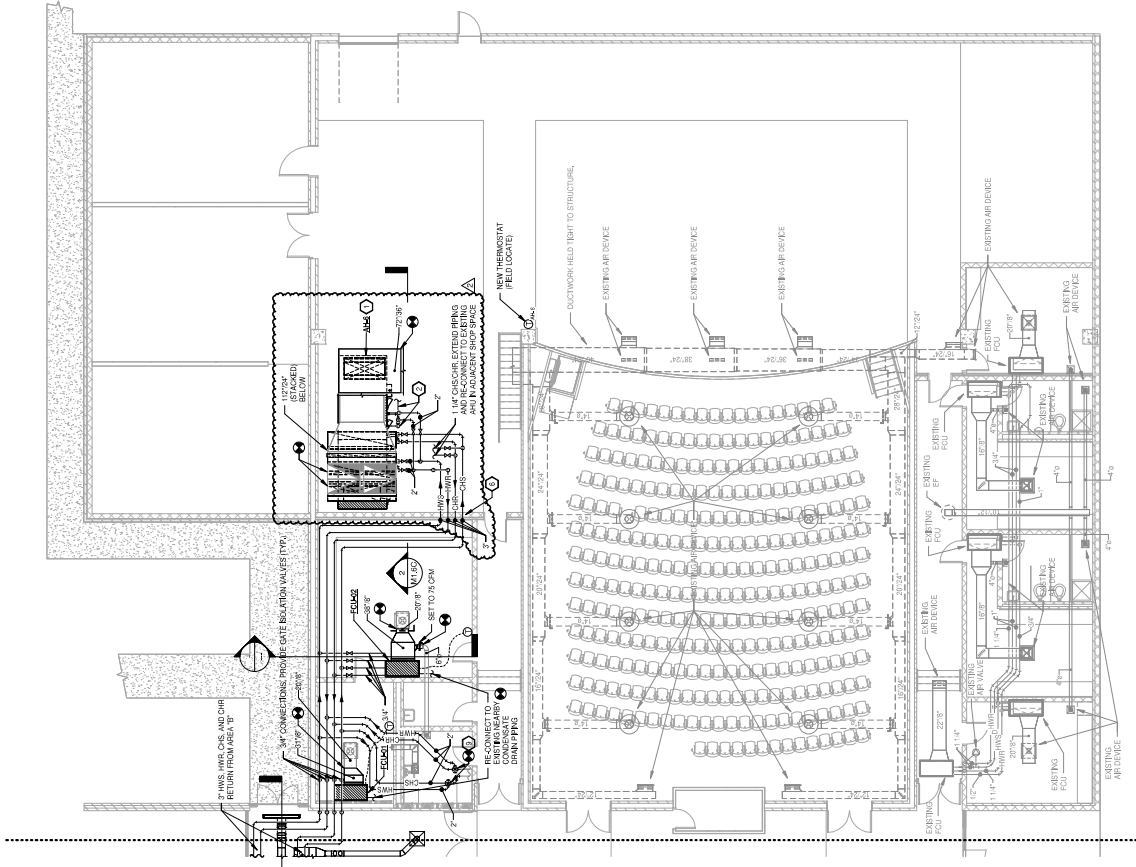
AUTHORIZED SIGNATURE

TITLE: Director, Technical and Warranty Services

THIS WARRANTY EXPIRES: November 18, 2038

HVAC THERMOSTAT WIRING NOTES

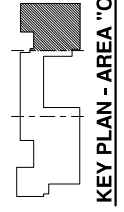
1. NEW THERMOSTAT / HUMIDISTAT WIRING TO BE ROUTED UNBUNDLED AT BLOCK WALLS AND/OR AT OTHER SOLID WALLS THAT WOULD REQUIRE SAW CUTTING AND OTHER MEASUREMENTS. WIRE COLOR SHALL MATCH WALL COLOR FOR WIREHOLE COLOR SHALL BE AS NOTED. DIRECTED BY ARCHITECT / OWNER. FIELD CHECK BEFORE INSTALLING.



2 AH-6 SECTION
 SCALE: 1/8" = 1'-0"

- HVAC KEYED NOTES**
1. RUN NEW CONDENSATE DRAIN FULL SIZE TO EXISTING CONDENSATE DRAIN TRIP.
 2. EXTEND 2" FISH WIRE TRIP TO **BASE** PER PREHEAT COIL.
 3. EXTEND 2" FISH WIRE TRIP TO **BASE** REHEAT COIL.
 4. CORE WALL SHALL BE REQUIR TO ROUTE TRIP THROUGH WALL. SEE REM PLAN FOR WALL LOCATION.
 5. CONNECT TO EXISTING SUPPLY DUCTWORK AND SUPPLY DUCT BLENDER.
 6. CONNECT TO EXISTING RETURN DUCTWORK AND RETURN DUCT BLENDER.
 7. NEW 4-WAY CHANGEOVER CONTROL VALVE TO SERVE EXISTING 2-PIPE FAN COIL UNIT.
 8. NEW 4-WAY CHANGEOVER CONTROL VALVE TO SERVE EXISTING 2-PIPE FAN COIL UNIT.
 9. NEW 4-WAY CHANGEOVER CONTROL VALVE TO SERVE EXISTING 2-PIPE FAN COIL UNIT.
 10. NEW 4-WAY CHANGEOVER CONTROL VALVE TO SERVE EXISTING 2-PIPE FAN COIL UNIT.
 11. NEW 4-WAY CHANGEOVER CONTROL VALVE TO SERVE EXISTING 2-PIPE FAN COIL UNIT.
 12. NEW 4-WAY CHANGEOVER CONTROL VALVE TO SERVE EXISTING 2-PIPE FAN COIL UNIT.
 13. NEW 4-WAY CHANGEOVER CONTROL VALVE TO SERVE EXISTING 2-PIPE FAN COIL UNIT.
 14. NEW 4-WAY CHANGEOVER CONTROL VALVE TO SERVE EXISTING 2-PIPE FAN COIL UNIT.
 15. NEW 4-WAY CHANGEOVER CONTROL VALVE TO SERVE EXISTING 2-PIPE FAN COIL UNIT.
 16. NEW 4-WAY CHANGEOVER CONTROL VALVE TO SERVE EXISTING 2-PIPE FAN COIL UNIT.
 17. NEW 4-WAY CHANGEOVER CONTROL VALVE TO SERVE EXISTING 2-PIPE FAN COIL UNIT.
 18. NEW 4-WAY CHANGEOVER CONTROL VALVE TO SERVE EXISTING 2-PIPE FAN COIL UNIT.
 19. NEW 4-WAY CHANGEOVER CONTROL VALVE TO SERVE EXISTING 2-PIPE FAN COIL UNIT.
 20. NEW 4-WAY CHANGEOVER CONTROL VALVE TO SERVE EXISTING 2-PIPE FAN COIL UNIT.

- HVAC GENERAL NOTES**
1. ALL LIGHTER SOLID LINES REPRESENT NEW DUCTWORK, EQUIPMENT, ETC. TO REMAIN.
 2. ALL DARKER SOLID LINES REPRESENT NEW FIPPC DUCTWORK, EQUIPMENT, ETC.
 3. FIELD VERIFY EXACT SEE AND LOCATION OF ALL EXISTING ITEMS SHOWN ON THE PLAN THAT ARE TO BE CONNECTED TO.
 4. REFER TO ALL FOR PROJECT FINISHING PLAN.

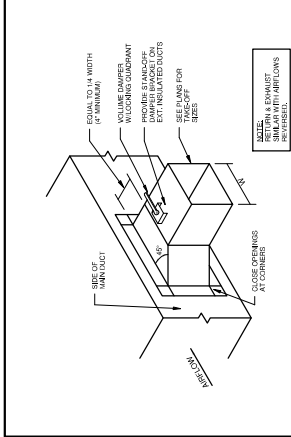


REGISTERED ARCHITECT
 STATE OF ARKANSAS
 NO. 75
 HENRIETTA PELTIER
 ARCHITECTS
 101 S. 3rd St.
 Conway, AR 72034

REGISTERED ENGINEER
 STATE OF ARKANSAS
 NO. 110
 JOHN W. HARRIS
 ENGINEERING
 101 S. 3rd St.
 Conway, AR 72034

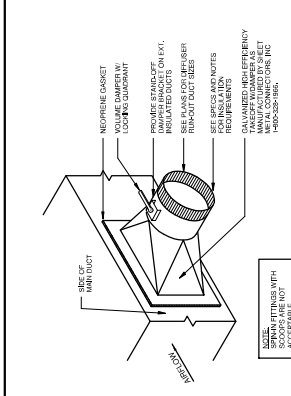
REGISTERED MECHANICAL ENGINEER
 STATE OF ARKANSAS
 NO. 110
 JOHN W. HARRIS
 ENGINEERING
 101 S. 3rd St.
 Conway, AR 72034

1 LEVEL 2 PLAN - RENOV PART C - HVAC
 SCALE: 1/8" = 1'-0"



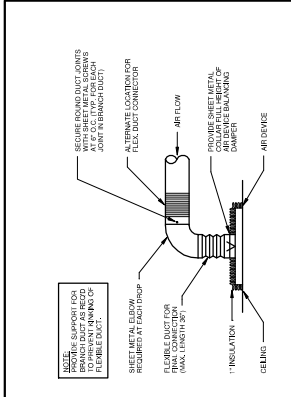
1 BRANCH DUCT TAKE-OFF DETAIL
N.T.S.

NOTE:
SEAL FITTINGS WITH
SIMILAR FITTINGS
EXTERIOR.

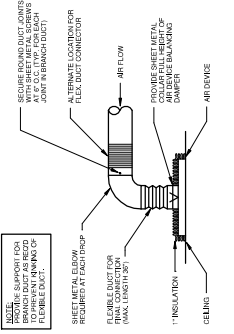


2 BRANCH DUCT TAKE-OFF DETAIL
N.T.S.

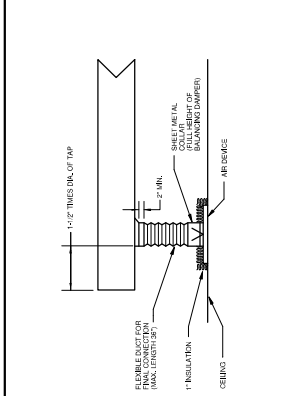
NOTE:
SEAL FITTINGS WITH
SIMILAR FITTINGS
ACCEPTABLE



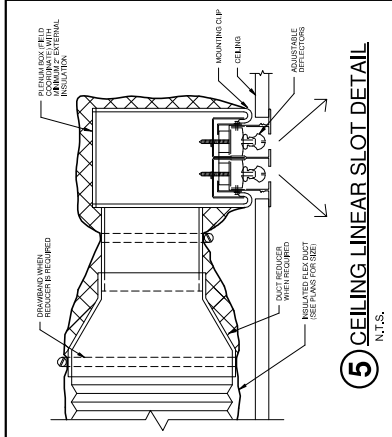
3 DIFFUSER CONNECTION DETAIL
N.T.S.



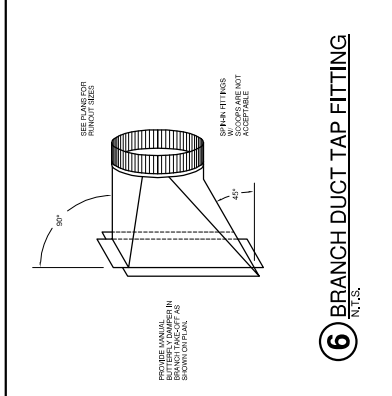
NOTE:
USE 1/2\"/>



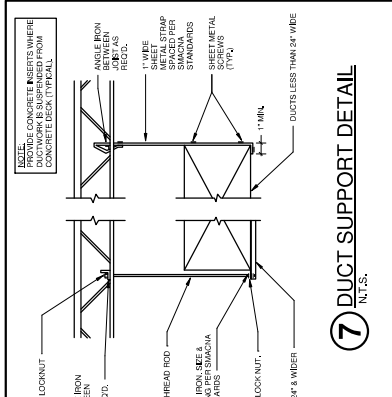
**4 DIFFUSER CONNECTION
END OF TRUNK DUCT**
N.T.S.



5 CEILING LINEAR SLOT DETAIL
N.T.S.

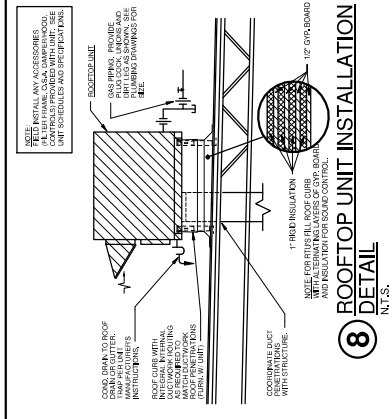


6 BRANCH DUCT TAP FITTING
N.T.S.

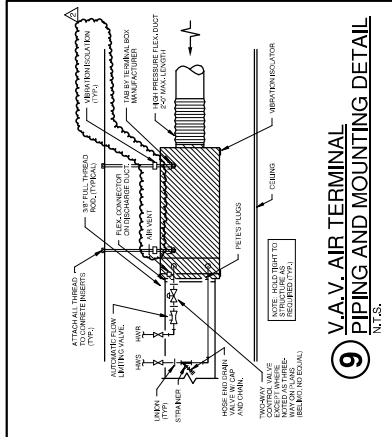


7 DUCT SUPPORT DETAIL
N.T.S.

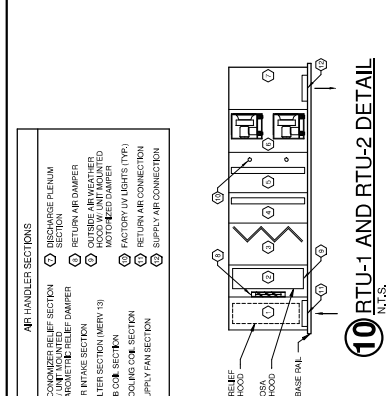
NOTE:
ALTERNATE CONCRETE INSERTS WHERE DUCTWORK IS SUSPENDED FROM CONCRETE (SEE TYPICAL)



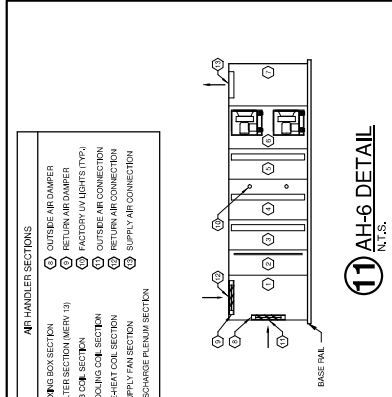
**8 ROOFTOP UNIT INSTALLATION
DETAIL**
N.T.S.



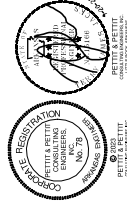
**9 V.A.V. AIR TERMINAL
PIPING AND MOUNTING DETAIL**
N.T.S.



10 RTU-1 AND RTU-2 DETAIL
N.T.S.



11 AH-6 DETAIL
N.T.S.



Sheet Number:
Title: HVAC DETAILS
Date: 06/20/23
Scale: AS SHOWN
Project: UCA SNOW FINE ARTS CENTER
10-2023
10-2023
10-2023
10-2023

M3.1
CONTRACT: UCA SNOW FINE ARTS CENTER
PROJECT: UCA SNOW FINE ARTS CENTER
10-2023
10-2023
10-2023
10-2023

H+N ARCHITECTS
1109 Main St. | Conway, AR | 501.327.7525 | www.hnarch.com

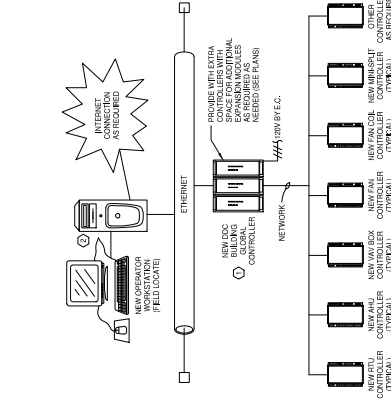
REM
501 W. 34th St.
Little Rock, AR 72201
501.371.6500
www.remarch.com

**UCA SNOW FINE ARTS CENTER
RENOVATIONS**
CONWAY, AR

INCH ON ORIGINAL DRAWING

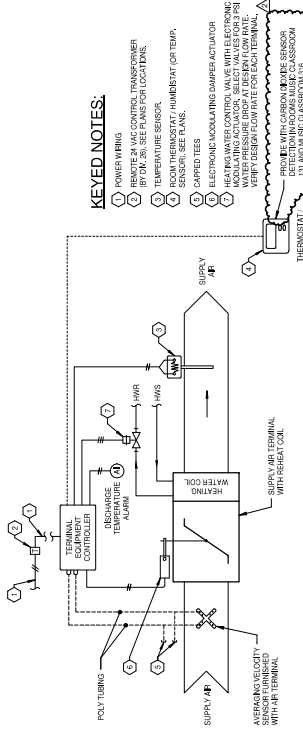
1. NEW ALERTON GAS CONTROLLER IN EXISTING FIRST FLOOR MECH ROOM. 2. NEW CONTROL WIRING WITH NEW RISER AND CONTROLS SYSTEM GRAPHICS.

GENERAL BAS CONTROL SYSTEM NOTE: ALL WIRING TO BE INSTALLED BY THE ELECTRICAL CONTRACTOR TO PROVIDE COMPLETE CONTROL SYSTEM GRAPHICS. ALL WIRING TO BE INSTALLED BY THE ELECTRICAL CONTRACTOR TO PROVIDE COMPLETE CONTROL SYSTEM GRAPHICS. ALL WIRING TO BE INSTALLED BY THE ELECTRICAL CONTRACTOR TO PROVIDE COMPLETE CONTROL SYSTEM GRAPHICS.



1 BUILDING AUTOMATION SYSTEM (BAS) RISER DIAGRAM

VAV TERMINAL SEQUENCE OF OPERATION: A VAV TERMINAL SEQUENCE OF OPERATION (S.O.P.) BASED UPON VAV TERMINAL SEQUENCE OF OPERATION COMMANDS OCCURRED DURING THE COOLING SEQUENCE. THE SPACE TEMPERATURE SETPOINT SHALL BE ADJUSTABLE BY THE OCCUPANT. THE VAV TERMINAL SHALL MONITOR THE SPACE TEMPERATURE AND CONTROL THE VAV TERMINAL TO MAINTAIN THE SPACE TEMPERATURE WITHIN THE SPACE TEMPERATURE SETPOINT. THE VAV TERMINAL SHALL MONITOR THE SPACE TEMPERATURE AND CONTROL THE VAV TERMINAL TO MAINTAIN THE SPACE TEMPERATURE WITHIN THE SPACE TEMPERATURE SETPOINT. THE VAV TERMINAL SHALL MONITOR THE SPACE TEMPERATURE AND CONTROL THE VAV TERMINAL TO MAINTAIN THE SPACE TEMPERATURE WITHIN THE SPACE TEMPERATURE SETPOINT.

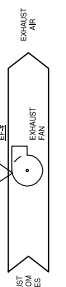


2 SUPPLY AIR TERMINAL W/ HOT WATER REHEAT (TYPICAL)

KEYED NOTES: 1. POWER WIRING 2. IDENTIFY W/ WAC CONTROL TRANSFORMER BY O.M. SEE PLANS FOR LOCATIONS. 3. TEMPERATURE SENSOR 4. ROOM THERMOSTAT HUB/UNIT OR TEMP. 5. GAPPED TEES 6. ELECTRONIC MODULATING DAMPER ACTUATOR 7. HEATING WATER CONTROL VALVE WITH ELECTRONIC WATER VALVE BODY - AS REQUIRED FOR EACH VAV TERMINAL. VERIFY DESIGN FLOW RATE FOR EACH TERMINAL. DETECT MIN FLOW RATE IN CLASSROOMS, 13 AND USE: CLASSROOMS ETC.

EXHAUST FAN - SEQUENCE OF OPERATION (TYPICAL)

EXHAUST FANS SHALL OPERATE INTERLOCKED WITH A SIGNAL FROM THE BUILDING AUTOMATION SYSTEM. THE EXHAUST FANS SHALL BE INTERLOCKED WITH THE BUILDING FIRE ALARM SYSTEM. STATUS: START/STOP



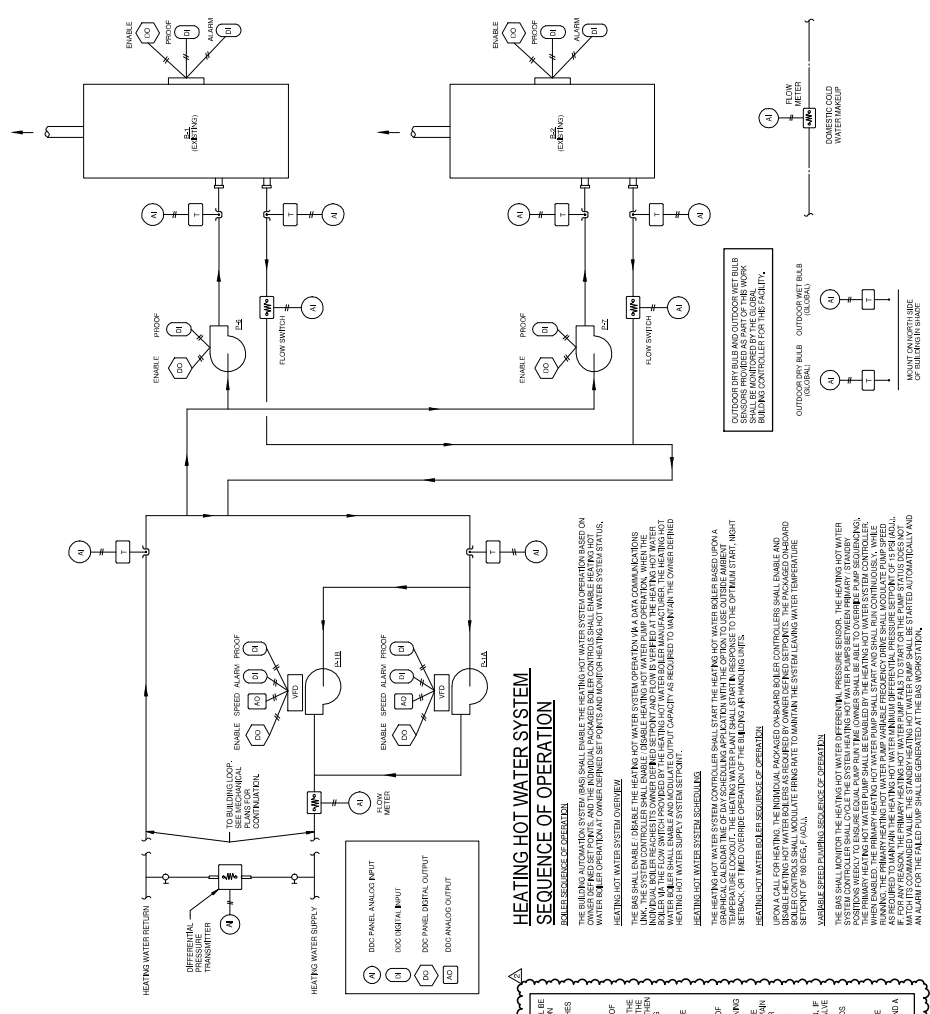
4 EXHAUST FAN (TYPICAL) CONTROL DIAGRAM

4-PIPE FAN COIL UNIT CONTROL DIAGRAM: 4-PIPE FAN COIL UNIT CONTROL DIAGRAM. THE UNIT SHALL BE INTERLOCKED WITH THE BUILDING AUTOMATION SYSTEM. THE UNIT SHALL BE INTERLOCKED WITH THE BUILDING FIRE ALARM SYSTEM. THE UNIT SHALL BE INTERLOCKED WITH THE BUILDING FIRE ALARM SYSTEM.

3 4-PIPE FAN COIL UNIT CONTROL DIAGRAM

HVAC CONTROLS GENERAL NOTES: 1. ALL FINAL SEQUENCES OF OPERATION TO BE DISCUSSED AND COORDINATE WITH THE ARCHITECT AND MECHANICAL ENGINEER. VERIFY DESIGN FLOW RATE FOR EACH TERMINAL. VERIFY DESIGN FLOW RATE FOR EACH TERMINAL. VERIFY DESIGN FLOW RATE FOR EACH TERMINAL.

HVAC CONTROL VALVE NOTES: 1. THE CONTROL VALVE SHALL BE 1/2\"/>



HEATING HOT WATER SYSTEM SEQUENCE OF OPERATION

ENABLE SEQUENCE OF OPERATION
 THE BUILDING AUTOMATION SYSTEM (BAS) SHALL ENABLE THE HEATING HOT WATER SYSTEM OPERATION BASED ON THE FOLLOWING SEQUENCE OF OPERATION:
 1. THE BAS SHALL ENABLE THE HEATING HOT WATER SYSTEM OPERATION IN THE FOLLOWING SEQUENCE:
 a. THE BAS SHALL RECEIVE A CALL FOR HEATING FROM THE HEATING HOT WATER SYSTEM CONTROLLER.
 b. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 c. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 d. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 e. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 f. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 g. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 h. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 i. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 j. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 k. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 l. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 m. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 n. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 o. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 p. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 q. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 r. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 s. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 t. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 u. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 v. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 w. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 x. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 y. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.
 z. THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE.

NOTE 1: THE BAS SHALL MONITOR THE HEATING HOT WATER SYSTEM CONTROLLER FOR A CALL FOR HEATING. UPON RECEIVING A CALL FOR HEATING, THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE. IF THE HEATING HOT WATER SYSTEM CONTROLLER IS NOT IN THE HEATING MODE, THE BAS SHALL NOT ISSUE A CALL FOR HEATING.

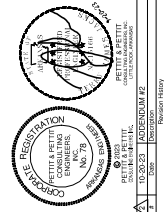
NOTE 2: THE BAS SHALL MONITOR THE HEATING HOT WATER SYSTEM CONTROLLER FOR A CALL FOR HEATING. UPON RECEIVING A CALL FOR HEATING, THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE. IF THE HEATING HOT WATER SYSTEM CONTROLLER IS NOT IN THE HEATING MODE, THE BAS SHALL NOT ISSUE A CALL FOR HEATING.

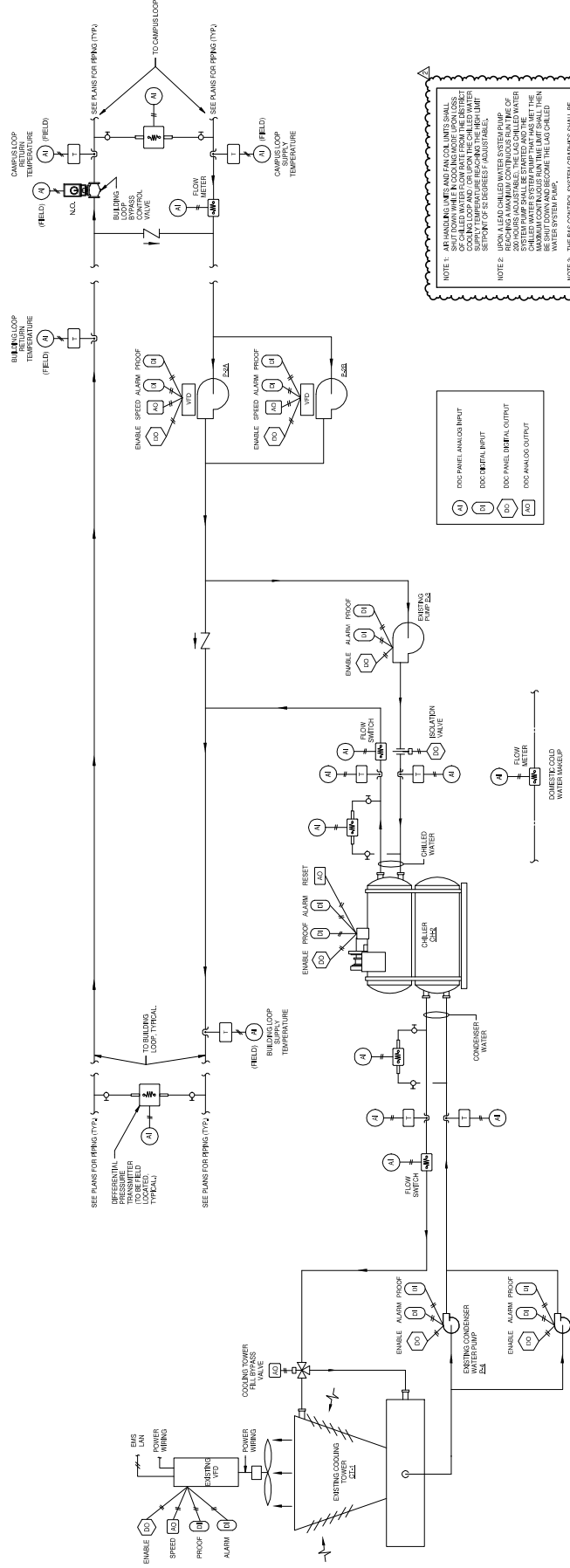
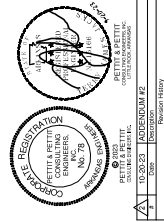
NOTE 3: THE BAS SHALL MONITOR THE HEATING HOT WATER SYSTEM CONTROLLER FOR A CALL FOR HEATING. UPON RECEIVING A CALL FOR HEATING, THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE. IF THE HEATING HOT WATER SYSTEM CONTROLLER IS NOT IN THE HEATING MODE, THE BAS SHALL NOT ISSUE A CALL FOR HEATING.

NOTE 4: THE BAS SHALL MONITOR THE HEATING HOT WATER SYSTEM CONTROLLER FOR A CALL FOR HEATING. UPON RECEIVING A CALL FOR HEATING, THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE. IF THE HEATING HOT WATER SYSTEM CONTROLLER IS NOT IN THE HEATING MODE, THE BAS SHALL NOT ISSUE A CALL FOR HEATING.

NOTE 5: THE BAS SHALL MONITOR THE HEATING HOT WATER SYSTEM CONTROLLER FOR A CALL FOR HEATING. UPON RECEIVING A CALL FOR HEATING, THE BAS SHALL VERIFY THAT THE HEATING HOT WATER SYSTEM CONTROLLER IS IN THE HEATING MODE. IF THE HEATING HOT WATER SYSTEM CONTROLLER IS NOT IN THE HEATING MODE, THE BAS SHALL NOT ISSUE A CALL FOR HEATING.

HEATING WATER SYSTEM CONTROL DIAGRAM





1 CHILLED WATER SYSTEM CONTROL DIAGRAM

CAMPUS CHILLED WATER SYSTEM SEQUENCE OF OPERATION

THE BAS SHALL MONITOR THE WATER TEMPERATURE SENSORS FOR THE SYSTEMS SERVED. CHILLED WATER SECONDARY PUMPS AND FLOW SWITCHES SHALL BE DUTY CYCLED EVERY 7 MINUTES. THE BAS SHALL MONITOR THE WATER TEMPERATURE SENSORS FOR THE SYSTEMS SERVED. CHILLED WATER SECONDARY PUMPS AND FLOW SWITCHES SHALL BE DUTY CYCLED EVERY 7 MINUTES. THE BAS SHALL MONITOR THE WATER TEMPERATURE SENSORS FOR THE SYSTEMS SERVED. CHILLED WATER SECONDARY PUMPS AND FLOW SWITCHES SHALL BE DUTY CYCLED EVERY 7 MINUTES.

LOCAL CHILLED WATER SYSTEM SEQUENCE OF OPERATION

THE BAS SHALL MONITOR THE WATER TEMPERATURE SENSORS FOR THE SYSTEMS SERVED. CHILLED WATER SECONDARY PUMPS AND FLOW SWITCHES SHALL BE DUTY CYCLED EVERY 7 MINUTES. THE BAS SHALL MONITOR THE WATER TEMPERATURE SENSORS FOR THE SYSTEMS SERVED. CHILLED WATER SECONDARY PUMPS AND FLOW SWITCHES SHALL BE DUTY CYCLED EVERY 7 MINUTES.

CONDENSER WATER SYSTEM SEQUENCE OF OPERATION

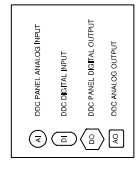
THE BUILDING OWNER SHALL ENABLE THE LOCAL CHILLED WATER SYSTEM OPERATOR BASED ON OWNER DEFINED PREFERENCES. THE CONDENSER WATER SYSTEM SHALL BE DUTY CYCLED EVERY 7 MINUTES. THE BAS SHALL MONITOR THE WATER TEMPERATURE SENSORS FOR THE SYSTEMS SERVED. CHILLED WATER SECONDARY PUMPS AND FLOW SWITCHES SHALL BE DUTY CYCLED EVERY 7 MINUTES.

NOTE 1: THE BAS SHALL MONITOR THE WATER TEMPERATURE SENSORS FOR THE SYSTEMS SERVED. CHILLED WATER SECONDARY PUMPS AND FLOW SWITCHES SHALL BE DUTY CYCLED EVERY 7 MINUTES. THE BAS SHALL MONITOR THE WATER TEMPERATURE SENSORS FOR THE SYSTEMS SERVED. CHILLED WATER SECONDARY PUMPS AND FLOW SWITCHES SHALL BE DUTY CYCLED EVERY 7 MINUTES.

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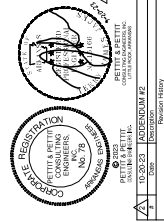
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CONSTANT AIR VOLUME MECHANICAL ROOM AIR HANDLING UNIT - SEQUENCE OF OPERATION

EMS-X

GENERAL DESCRIPTION:
 OUTDOOR FRESH AIR CONSTANT VOLUME AIR HANDLING UNIT SHALL SERVE INDIVIDUAL AREAS WITHIN THE INTERIOR SPACES AS A SINGLE ZONE SYSTEM.

UNIT GENERALS:
 THE AIR HANDLING UNIT SHALL BE CAPABLE OF OPERATING IN BOTH HEATING AND COOLING MODES. THE AIR HANDLING UNIT SHALL BE CAPABLE OF OPERATING IN BOTH HEATING AND COOLING MODES. THE AIR HANDLING UNIT SHALL BE CAPABLE OF OPERATING IN BOTH HEATING AND COOLING MODES. THE AIR HANDLING UNIT SHALL BE CAPABLE OF OPERATING IN BOTH HEATING AND COOLING MODES.

SEQUENCE OF OPERATION:
 THE AIR HANDLING UNIT SHALL BE CONTROLLED BY THE BAS SYSTEM. THE AIR HANDLING UNIT SHALL BE CONTROLLED BY THE BAS SYSTEM. THE AIR HANDLING UNIT SHALL BE CONTROLLED BY THE BAS SYSTEM. THE AIR HANDLING UNIT SHALL BE CONTROLLED BY THE BAS SYSTEM.

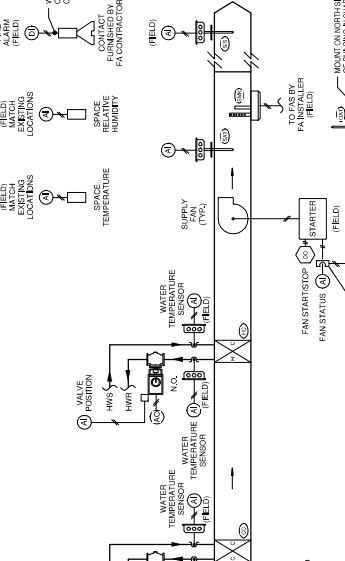
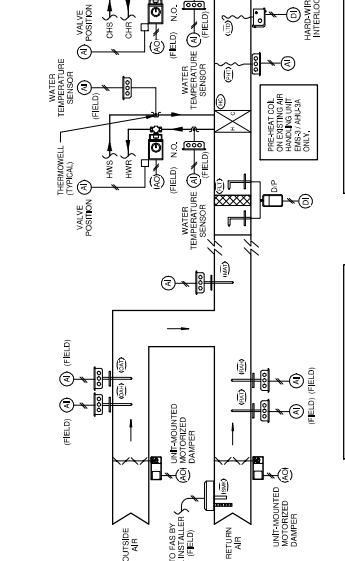
COOLING:
 THE ENTIRE UNIT PROVIDED WITH A CHILLED WATER COIL FOR COOLING.

HEATING:
 THE ENTIRE UNIT PROVIDED WITH A HEATING HOT WATER COIL FOR HEATING.

CONTROL LOGIC:
 THE AIR HANDLING UNIT SHALL BE CONTROLLED BY THE BAS SYSTEM. THE AIR HANDLING UNIT SHALL BE CONTROLLED BY THE BAS SYSTEM. THE AIR HANDLING UNIT SHALL BE CONTROLLED BY THE BAS SYSTEM. THE AIR HANDLING UNIT SHALL BE CONTROLLED BY THE BAS SYSTEM.

1. SUPPLY AIR TEMP.
2. OUTSIDE AIR TEMP.
3. SPACE RELATIVE HUMIDITY
4. COOLING AIR TEMP.
5. HEATING AIR TEMP.
6. RETURN AIR RELATIVE HUMIDITY
7. LOW LIMIT STATUS
8. HIGH LIMIT STATUS
9. HEATING VALVE OPEN %
10. COOLING VALVE OPEN %
11. ELECTRONIC LEAK DETECTION
12. BAC LOOP PARAMETERS

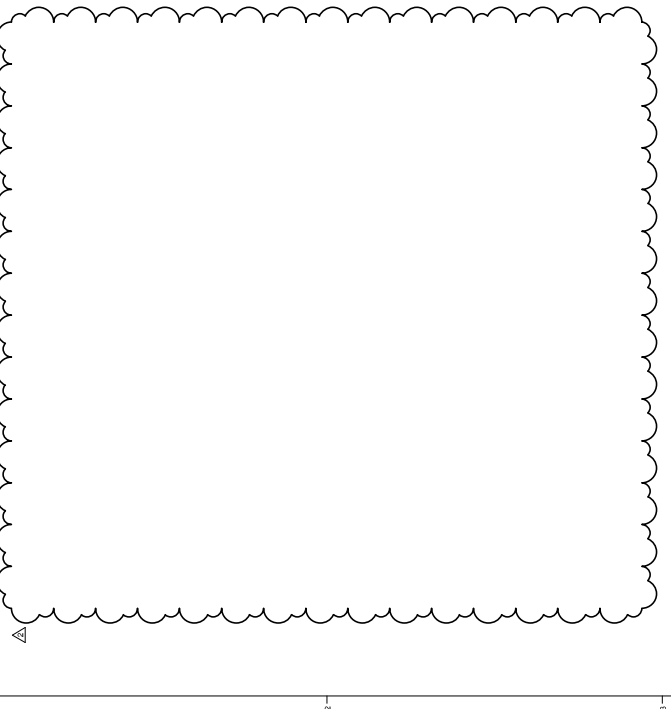
1. THE INTERLOCK SHALL BE CONTROLLED BY COMPARING THE OUTSIDE AIR TEMPERATURE TO THE INTERLOCK AMBIENT TEMPERATURE SETPOINT FOR THE UNIT. WHEN THE TEMPERATURE SENSORS FOR THE AIR HANDLING UNIT SHALL BE USED FOR THE COMMAND AND OTHER PROCESSES.
2. THE EXHAUST FAN SHALL BE MONITORED AND ALARMED AT THE AIR HANDLING UNIT CONTROLLER AND THE BAS.
3. THE AIR HANDLING UNIT SHALL ONLY BE OCCUPIED MORE TO OCCUPY OCCURRED HOURS AND TIME.
4. THE EXHAUST FAN SHALL BE MONITORED AND ALARMED AT THE AIR HANDLING UNIT CONTROLLER AND THE BAS.
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19. THE EXHAUST FAN SHALL BE MONITORED AND ALARMED AT THE AIR HANDLING UNIT CONTROLLER AND THE BAS.
20. THE EXHAUST FAN SHALL BE MONITORED AND ALARMED AT THE AIR HANDLING UNIT CONTROLLER AND THE BAS.



REVISIONS TO THIS DRAWING SHALL BE MADE BY THE ENGINEER. THE ENGINEER SHALL BE RESPONSIBLE FOR ALL THERMOSTATS, INTERLOCKS, AND CONTROL LOGIC. THE ENGINEER SHALL BE RESPONSIBLE FOR ALL THERMOSTATS, INTERLOCKS, AND CONTROL LOGIC. THE ENGINEER SHALL BE RESPONSIBLE FOR ALL THERMOSTATS, INTERLOCKS, AND CONTROL LOGIC.

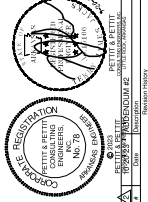
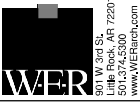
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AIR HANDLING UNIT EMS-X W/ HOT WATER & CHILLED WATER COILS



PLUMBING GENERAL NOTES

- THE CONTRACTOR SHALL PRIOR TO THE START OF ANY WORK, INSURE THE CONTRACTOR'S SITE. VERIFY SIZE, LOCATION, ETC. OF ANY EXISTING PIPING NOTED, SHOWN OR IMPLIED, TO WHICH NEW PIPING IS RELATED OR CONNECTED.
- ALL WATER SUPPLIES TO FIXTURES SHALL BE AS FOLLOWS, UNLESS SHOWN OR NOTED OTHERWISE:
 - WALL MOUNTED CLOSET - 1/2"
 - WALL MOUNTED SINK - 1/2"
 - SINK - 1/2"
 - SINK WITH WATER COOLER - 1/2"
 - STOVE - 3/4"
 - REFRIGERATOR - 1/2"
 - REFRIGERATOR WALL HUNG - 3/4"
 - REFRIGERATOR WALL HUNG WITH ICE MAKER - 1/2"
 - CUPBOARD SINK - 1/2"
 - CUPBOARD SINK WITH ICE MAKER - 1/2"
 - SUBSIDIARY SINK - 1/2"
 - EMERGENCY SHOWER EYEWASH - 1-1/4"
- ALL WATER HANDED APPLIANCES EQUAL TO DRAIN THROUGH TO EACH WORKING CLOSING VALVE. MANUFACTURER'S RECOMMENDATIONS MUST BE ACCESSIBLE WHERE POSSIBLE ABOVE CEILING.
- WALL MOUNTED SINKS SHALL BE PROVIDED WITH WALL ANCHORS TO CROSS MEMBER SUPPORT BEFORE THE ENTIRE ROOM SPACE TO ASSURE NO PIPE MOVEMENT WITHIN WALL CAVITY.
- ALL FLOOR DRAIN SHALL BE PROVIDED WITH TRAP WITH NOT LESS THAN FOUR INCHES THROUGH THE WALL TO THE MAIN DRAIN.
- ALL VENTS THROUGH ROOF TOPS SHALL BE PROVIDED WITH 1/2" x 2" x 12" SIZES FLASHING WHERE STANDING SEAM TYPE IS USED. THE FLASHING SHALL BE IN ACCORDANCE WITH THE ROOFING CONTRACTOR'S DRAWINGS AND SPECIFICATIONS. FLASHING SHALL BE MAINTAINED TO ASSURE Airtightness. ALL OTHER SPECIAL MATERIALS SHALL BE MANUFACTURED RUBBER ROOF WITH STAINLESS STEEL AND POLYURETHANE. ALL OTHER MATERIALS SHALL BE APPROVED AND MUST BE COMPATIBLE WITH ROOFING SYSTEM AND ROOFING MATERIALS.
- FLUSH VALVES SHALL BE MOUNTED SUCH THAT THE EMERGENCY FRESH VALVE CENTERLINE TO FRESH FLOOR SHALL BE 96" (DOES NOT APPLY TO ELECTRONIC FRESH VALVES WHERE MOUNTED AT STANDARD HEIGHT, SEE SPECIFICATIONS AND WATER CLOSET RETAIN, 96" WHERE THE SYMBOL OCCURS ON THE DRAWINGS. REFERENCE SHOULD BE MADE TO THE HETED NOTES ON THAT SAME SHEET AND THE CORRESPONDING NUMBER OF THAT NOTE.
- WHERE PLUMBING FIXTURES ARE LOCATED ON EXTERIOR WALL, WATER PIPING SHALL BE INSTALLED TO PLUMBING, HVAC, FIRE PROTECTION AND ELECTRICAL PLANS.
- WHERE PLUMBING FIXTURES ARE LOCATED IN CEILING, PIPING SHALL BE INSTALLED TO PLUMBING, HVAC, FIRE PROTECTION AND ELECTRICAL PLANS.
- FIELD COORDINATE LOCATE FLOOR CLEANOUT TRAP VALVES IN JANITORS ROOMS, STORAGE ROOMS, ETC. DO NOT LOCATE NEAR DOORWAYS.
- PROVIDE FIRE STOPPING OR FIRE STOP SLEEVE DEVICES AT ALL WATERTIGHT ASSEMBLIES - SEE ARCHITECTURAL SPECIFICATIONS AND ARCHITECTURAL DRAWINGS FOR DETAILS.
- DO NOT CONNECT TRAP TIE TO WATER LINES LARGER THAN 1/2". SEE TRY TO LOCATE TRAP TIE FROM ROOM TO MAIN DRAIN. IF THE TRAP TIE IS NOT LOCATED IN THE ROOM, THE TRAP TIE SHALL BE LOCATED AT THE MAIN DRAIN. TRAP TIE SHALL BE PROVIDED PLUMBING PRODUCTS MODEL TPAP-01 WHERE FLOOR DRAIN OCCURS NEAR WATER CLOSET. USE A HIGH QUALITY BRASS TRAP TIE WITH CAST CHROME FLANGE TO WALL.
- COORDINATE EXACT LOCATIONS OF ALL PLUMBING PIPING WITH ARCHITECTURAL AND STRUCTURAL DRAWINGS.
- VERIFY WITH ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS OF ALL HVAC PLUMBING FIXTURES.
- ALL JANITOR ROOMS SHALL HAVE FLOOR DRAIN.
- ALL SANITARY SEWER RIFERS SHALL HAVE CLEANOUT AT THE BASE WALL CLEANOUT OR FLOOR AT 6'0" ON "O" WALL CLEANOUT AT THE BASE OF ALL RISERS.
- INSTALL PIPING EXPANSION JOINTS IN ALL PIPING THAT CROSSES BUILDING EXPANSION JOINTS. SEE ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS OF ALL EXPANSION JOINTS.
- TRUCKWAY CLEANOUTS SHALL BE INSTALLED AT THE JUNCTION OF THE BUILDING DRAIN AND THE BUILDING SEWER (TYP ALL AREAS) - MUST BE INSTALLED TO MEET PLUMBING CODES, EVENTIF NOT SHOWN ON DRAWING - TRAP AND COORDINATE WITH CIVIL UTILITY DRAWINGS.



SYMBOL	DESCRIPTION
(Symbol)	SOIL WASTE OR SANITARY SEWER
(Symbol)	SEWER
(Symbol)	SANITARY SEWER (ON REEF)
(Symbol)	FLOOR DRAIN
(Symbol)	ROOF DRAIN
(Symbol)	ACCESS DOOR
(Symbol)	VENT THRU ROOF
(Symbol)	HOT WATER
(Symbol)	HOT WATER RETURN
(Symbol)	CLEANOUT PLUG
(Symbol)	FLOOR CLEANOUT
(Symbol)	PROJECT DRAIN
(Symbol)	NATURAL GAS (LOW PRESSURE GAS)
(Symbol)	FLOW DIRECTION
(Symbol)	GATE VALVE
(Symbol)	GLOBE VALVE
(Symbol)	CHECK VALVE
(Symbol)	BALL VALVE
(Symbol)	FLUID COOK - GAS COOK
(Symbol)	PRESSURE REDUCING VALVE
(Symbol)	STRAINER

PROJECT PHASING PLAN

THE PROJECT PHASING PLAN IS A TIME SCHEDULE FOR THE PROJECT. THE PROJECT PHASING PLAN IS A TIME SCHEDULE FOR THE PROJECT. THE PROJECT PHASING PLAN IS A TIME SCHEDULE FOR THE PROJECT.

WATER HEATER SCHEDULE

1. WATER HEATER - 40 GPM MODEL ESS-129 COMMERCIAL GAS 34 GALLON ACRYLIC - 40 GPM VACUUM RELIEF VALVE - FINISH GALVANIZED STEEL PIPING - 2" PVC - SUPPLY WITH CONDENSING VENT PIPE AND CONDENSATE RETURN PIPING.

SYMBOL	DESCRIPTION
(Symbol)	NEW FIXTURE
(Symbol)	ROUGH IN AND FINAL CONNECT ONLY
(Symbol)	EXISTING FIXTURE TO REMAIN
(Symbol)	EXISTING FIXTURE TO BE REMOVED
(Symbol)	EXISTING FIXTURE (RELOCATED OR REPAIRED - SEE NOTES)

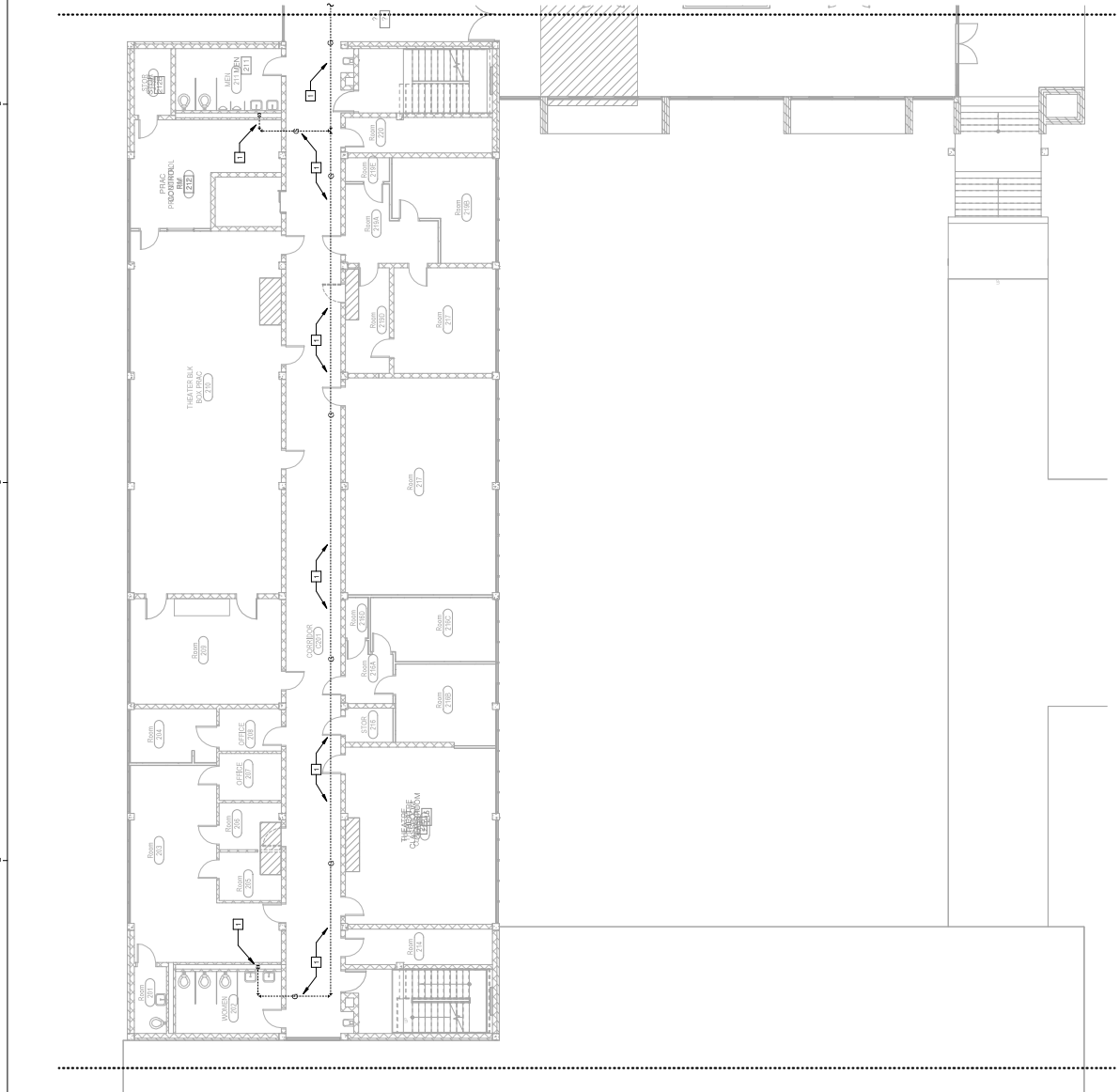
GENERAL PLUMB. DEMO. NOTES

1. FIELD VERIFY EXISTING PLUMBING LOCATIONS, TYPES, ETC. VERIFY EXISTING PLUMBING PIPES LOCATIONS, SIZES, ETC.
2. CUT WALLS, FLOORS OR CEILING AS REQUIRED TO INSTALL NEW PIPING. ALL FURNISHING AND REMOVALS SHALL BE BY THE GENERAL CONTRACTOR. COORDINATE REQUIREMENTS WITH THE GENERAL CONTRACTOR.
3. REMOVE EXISTING WATER, SANITARY, ACID WASTE, AND VENT PIPING AS REQUIRED TO INSTALL NEW PLUMBING PIPES.
4. WHERE EXISTING FITTINGS AND EQUIPMENT ARE REMOVED AND NOT REPLACED, CAP ALL PIPING WITHIN WALLS, FLOORS OR CEILING AS REQUIRED FOR CONCRETE.
5. REMOVE ALL EXPOSED EXISTING PIPING WHICH IS DEEMED UNREPAIRABLE AS A RESULT OF THE CONTRACT UNLESS SHOWN ON NOTED OTHERSHEET.
6. EXISTING PIPE TO WHICH NEW PIPE IS CONNECTED SHALL BE ROUGHED, FLUSHED AND CLEANED NEAR POINT OF CONNECTION TO MAIN OUTSIDE BUILDING.
7. EXISTING FLOOR DRAINS WITHIN SCOPE OF CONSTRUCTION SHALL BE THOROUGHLY CLEANED. EXISTING FLOOR DRAIN PIPING SHALL BE ROUGHED AND CLEANED TO THE POINT OF CONNECTION TO THE MAIN.
8. ALL PLUMBING FITTINGS, VALVES, PIPING AND CONNECTIONS ARE TO BE REMOVED AND NOT RELOCATED SHALL BECOME THE PROPERTY OF THE OWNER AND DELIVERED TO STORAGE ON SITE AS DIRECTED BY THE OWNER.

PLUMBING DEMO. KEYED NOTES

1. RECONNECT AND REINSTALL EXISTING GAS PIPING AND ASSOCIATED VENT AND FUEL PIPING AS SHOWN ON THIS PLAN. PREP ALL OTHER EXISTING WATER LINES TO BE RECONNECTED TO NEW GAS WATER PIPING.

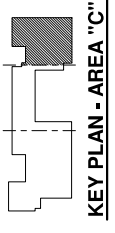
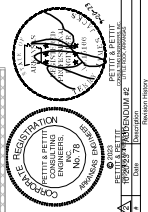
2. RECONNECT EXISTING GAS PIPING AND ALL OTHER ASSOCIATED PIPING TO REMAIN.



1 LEVEL 2 PLAN - DEMO PART B - PLUMBING
 SCALE: 1/8" = 1'-0"

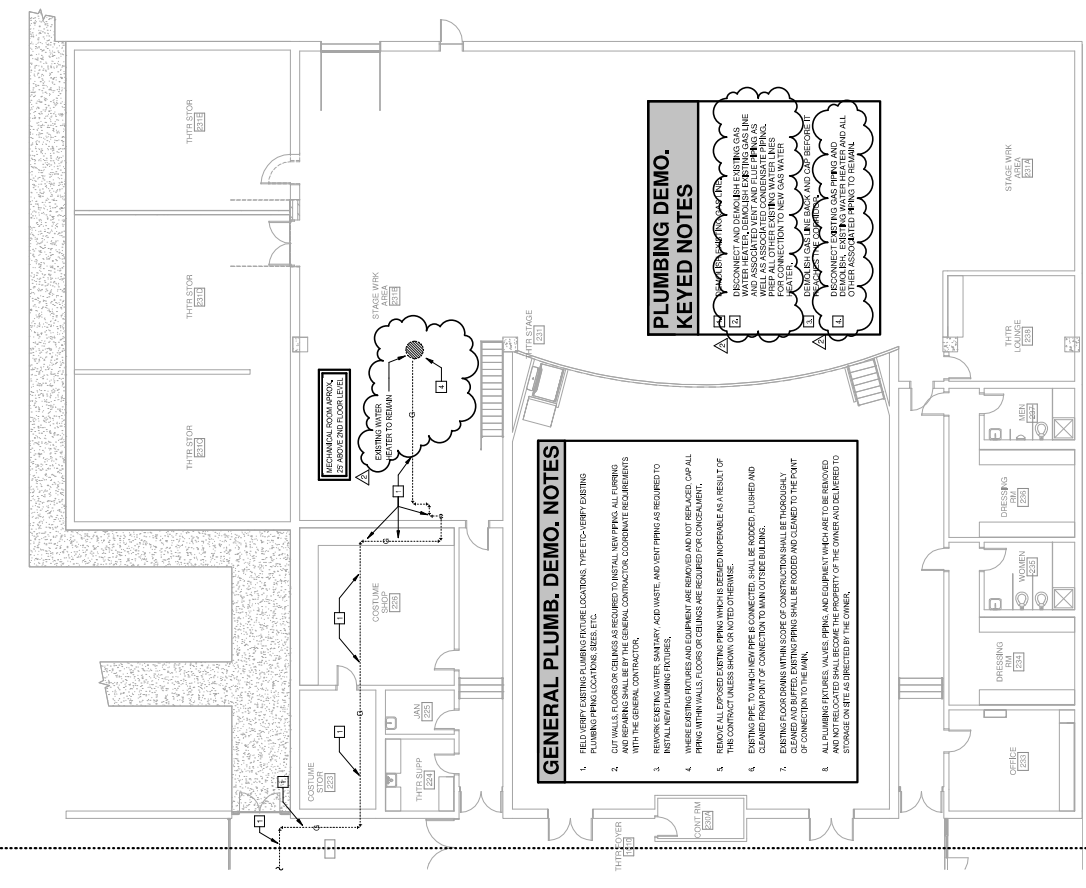
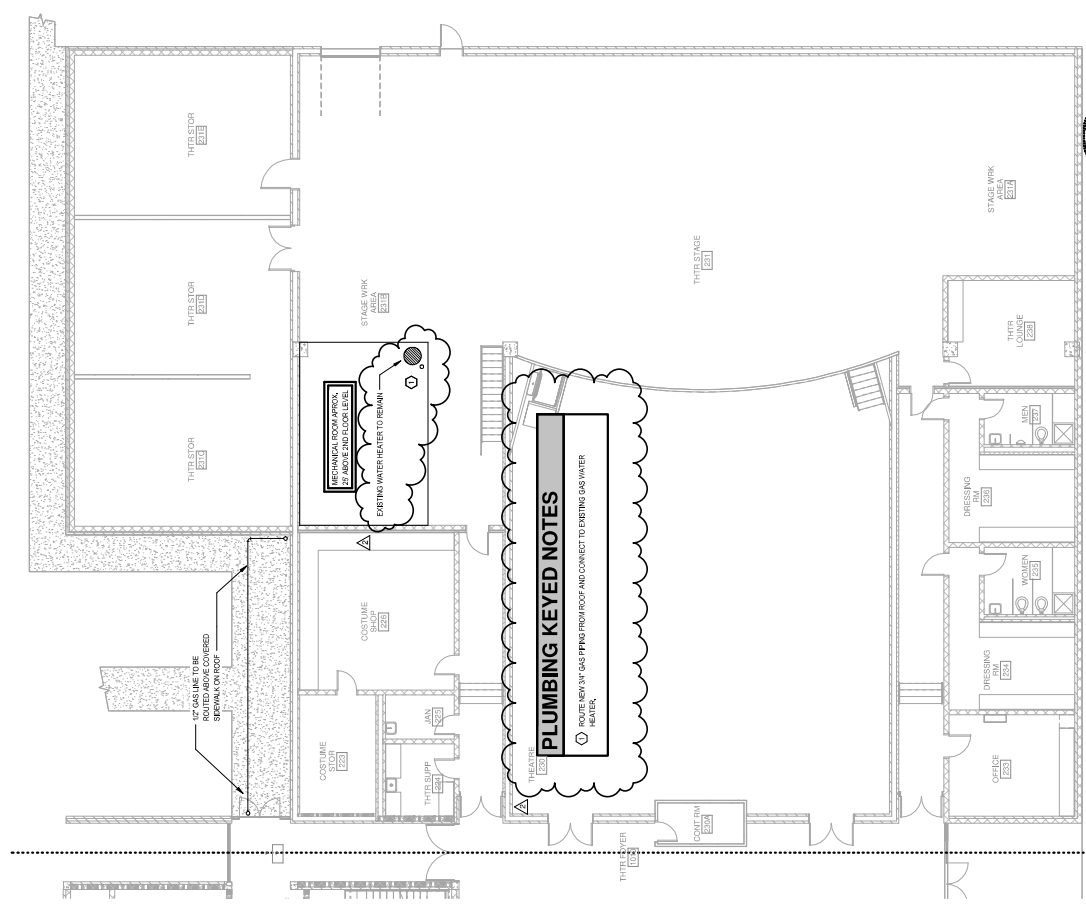
KEY PLAN - AREA "B"

REGISTERED PROFESSIONAL ENGINEER
 STATE OF ARIZONA
 LICENSE NO. 12345
 REGISTERED PROFESSIONAL ENGINEER
 STATE OF ARIZONA
 LICENSE NO. 67890



2 LEVEL 2 PLAN - RENOV PART C - PLUMBING
 SCALE: 1/8" = 1'-0"

1 LEVEL 2 PLAN - DEMO PART C - PLUMBING
 SCALE: 1/8" = 1'-0"



GENERAL PLUMB. DEMO. NOTES

- FIELD VERIFY EXISTING PLUMBING ROUTE LOCATIONS, TYPE ETC-VERIFY EXISTING PLUMBING LOCATIONS, SIZES, ETC.
- CUT WALLS FLOORS OR CEILINGS AS REQUIRED TO INSTALL NEW PIPING. ALL FLOORING AND REPAIRING SHALL BE BY THE GENERAL CONTRACTOR. COORDINATE REQUIREMENTS WITH THE GENERAL CONTRACTOR.
- REMOVE EXISTING WATER, SANITARY, ACID WASTE, AND VENT PIPING AS REQUIRED TO INSTALL NEW PLUMBING ROUTES.
- WHERE EXISTING TOUGHS AND EQUIPMENT ARE REMOVED AND NOT REPLACED, CAP ALL PIPING WITH WELDS. TAPES OR GELINGS ARE REQUIRED FOR CONSEQUENT.
- REMOVE ALL EXPOSED EXISTING PIPING WHICH IS DEEMED UNREPAIRABLE AS A RESULT OF THIS CONTRACT UNLESS SHOWN OTHERWISE.
- REMOVE PIPING TO NEW PIPE CONNECTIONS. SIZE BE SMOOTH, FLUSH AND CLEANED FREE OF OBSTRUCTION TO NEW SERVICE DELIVER.
- REMOVE AND REPAIR EXISTING PIPING SHALL BE REWORKED AND CLEANED TO THE EXTENT OF CONNECTION TO THE MAIN.
- ALL PLUMBING FITTINGS, VALVES, PIPING, AND EQUIPMENT WHICH ARE TO BE REMOVED AND NOT RELOCATED SHALL BECOME THE PROPERTY OF THE OWNER AND DELIVERED TO STORAGE ON SITE AS DIRECTED BY THE OWNER.

PLUMBING DEMO. KEYED NOTES

- REMOVE EXISTING WATER, SANITARY, ACID WASTE, AND VENT PIPING AS REQUIRED TO INSTALL NEW PLUMBING ROUTES.
- REMOVE EXISTING TOUGHS AND EQUIPMENT ARE REMOVED AND NOT REPLACED, CAP ALL PIPING WITH WELDS. TAPES OR GELINGS ARE REQUIRED FOR CONSEQUENT.
- REMOVE ALL EXPOSED EXISTING PIPING WHICH IS DEEMED UNREPAIRABLE AS A RESULT OF THIS CONTRACT UNLESS SHOWN OTHERWISE.
- REMOVE PIPING TO NEW PIPE CONNECTIONS. SIZE BE SMOOTH, FLUSH AND CLEANED FREE OF OBSTRUCTION TO NEW SERVICE DELIVER.
- REMOVE AND REPAIR EXISTING PIPING SHALL BE REWORKED AND CLEANED TO THE EXTENT OF CONNECTION TO THE MAIN.
- ALL PLUMBING FITTINGS, VALVES, PIPING, AND EQUIPMENT WHICH ARE TO BE REMOVED AND NOT RELOCATED SHALL BECOME THE PROPERTY OF THE OWNER AND DELIVERED TO STORAGE ON SITE AS DIRECTED BY THE OWNER.

PLUMBING KEYED NOTES

- ROUTE NEW GAS PIPING FROM ROOF AND CONNECT TO EXISTING GAS WATER HEATER.
- EXISTING WATER HEATER TO REMAIN.

PLUMBING KEYED NOTES

- ROUTE NEW GAS PIPING FROM ROOF AND CONNECT TO EXISTING GAS WATER HEATER.
- EXISTING WATER HEATER TO REMAIN.

1/2" GAS LINE TO BE INSTALLED SHOWING ON ROOF

RECONNECT EXISTING WATER, SANITARY, ACID WASTE, AND VENT PIPING AS REQUIRED TO INSTALL NEW PLUMBING ROUTES.

GENERAL PLUMB. DEMO. NOTES

- REMOVE ALL PLUMBING FROM THE FOLLOWING LOCATIONS: THEATRE PIPE, EXISTING PLUMBING FROM LOCKERS, SIZES, ETC.
- FOR WALLS, BLOCKS OR CEILING AS MENTIONED IN THIS PLAN, ALL PLUMBING AND REMAINS SHALL BE THE GENERAL CONTRACTOR'S RESPONSIBILITY AND COORDINATE WITH THE GENERAL CONTRACTOR.
- REMOVE EXISTING WATER, SANITARY, ACID WASTE, AND VENT PIPING AS REQUIRED TO INSTALL NEW PLUMBING FEATURES.
- WHERE EXISTING FITTINGS AND EQUIPMENT ARE REMOVED AND NOT REPLACED, CAP ALL PIPING WITHIN WALLS, FLOORS OR CEILING AS REQUIRED FOR CONFORMANCE.
- REMOVE ALL EXPOSED EXISTING PIPING WHICH IS BEING IMPERMISSIBLE AS A RESULT OF THE CONTRACT UNLESS SHOWN OR NOTED OTHERWISE.
- EXISTING PIPE TO WHICH NEW PIPE IS CONNECTED SHALL BE ROOVED, FLUSHED AND CLEANED PROXIMATE TO CONNECTION TO MAKE OUTLINE BUILDING.
- EXISTING FLOOR DRAINS WITHIN SCOPE OF CONSTRUCTION SHALL BE THOROUGHLY CLEANED AND BIFFED. EXISTING PIPING SHALL BE ROOVED AND CLEANED TO THE POINT OF CONNECTION TO THE MAIN.
- ALL PLUMBING FITURES, VALVES, PIPING, AND EQUIPMENT WHICH ARE TO BE REMOVED SHALL BE DEMOLISHED AND REMOVED FROM THE PROJECT AND STORED TO STORAGE ON SITE AS DIRECTED BY THE OWNER.

PLUMBING DEMO. KEYED NOTES

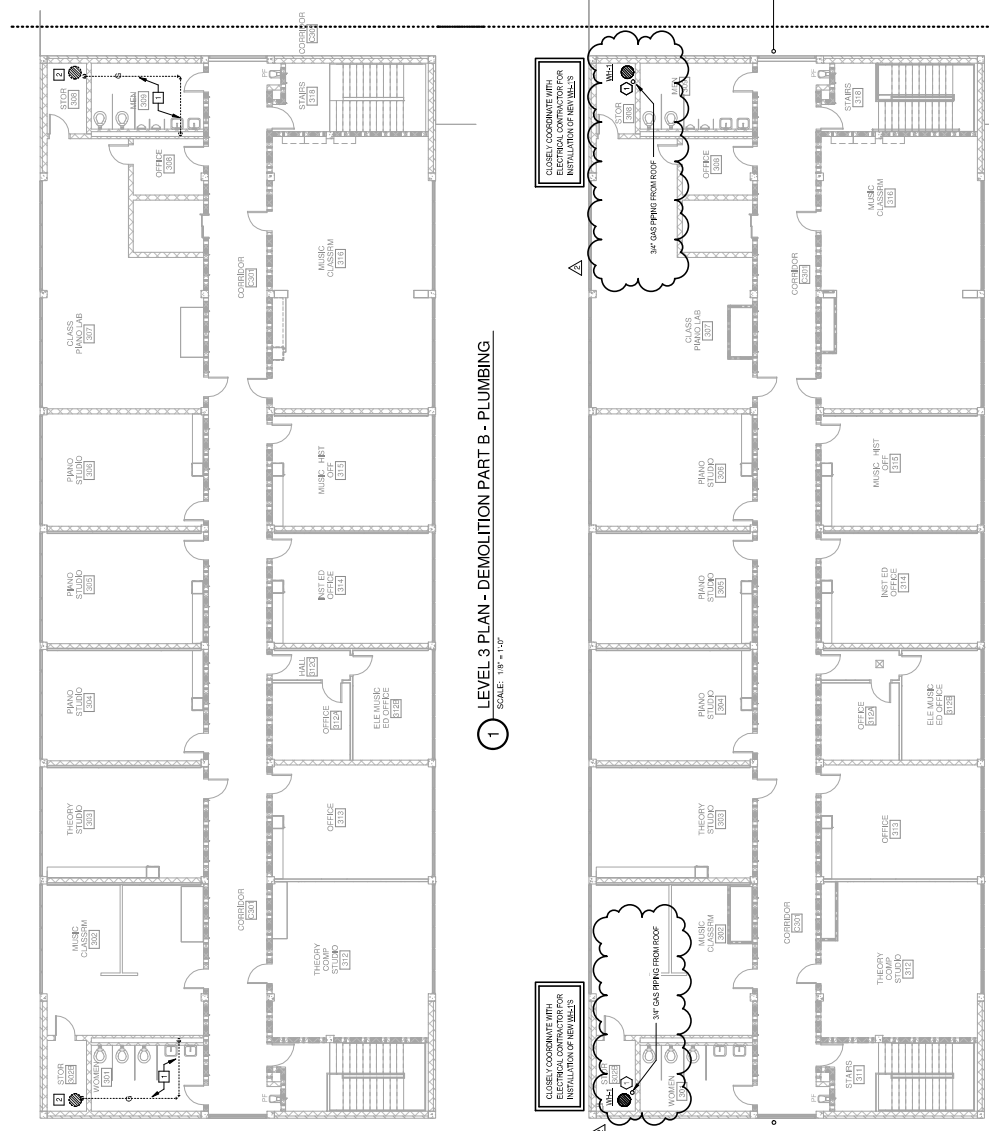
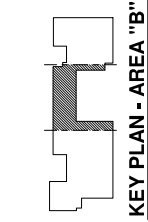
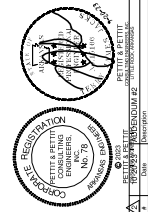
REMOVE EXISTING PIPING TO CLEANLINE.
 DISCONNECT AND DEMOLISH EXISTING GAS AND ASSOCIATED VENT AND FLUE PIPING AS WELL AS ALL EXISTING WATER PIPING. PREPARE ALL OTHER EXISTING WATER LINES WITH VALVE CONNECTION TO CARRY GAS WATER MAIN TO MAIN LINE AS SHOWN AND RETURN TO MAIN LINE.

DISCONNECT EXISTING GAS PIPING AND RETURN TO MAIN LINE AS SHOWN AND RETURN TO MAIN LINE.

DISCONNECT EXISTING GAS PIPING AND RETURN TO MAIN LINE AS SHOWN AND RETURN TO MAIN LINE.

PLUMBING KEYED NOTES.

EXTEND AND CONNECT EXISTING WATER PIPING TO NEW WATER HEATER IN THIS ROOM. EXTEND AND CONNECT EXISTING CONDENSATE LINE THROUGH CONDENSATE TRAP/VALVE TO EXISTING FLOOR DRAIN.



1 LEVEL 3 PLAN - DEMOLITION PART B - PLUMBING
 SCALE: 1/8" = 1'-0"

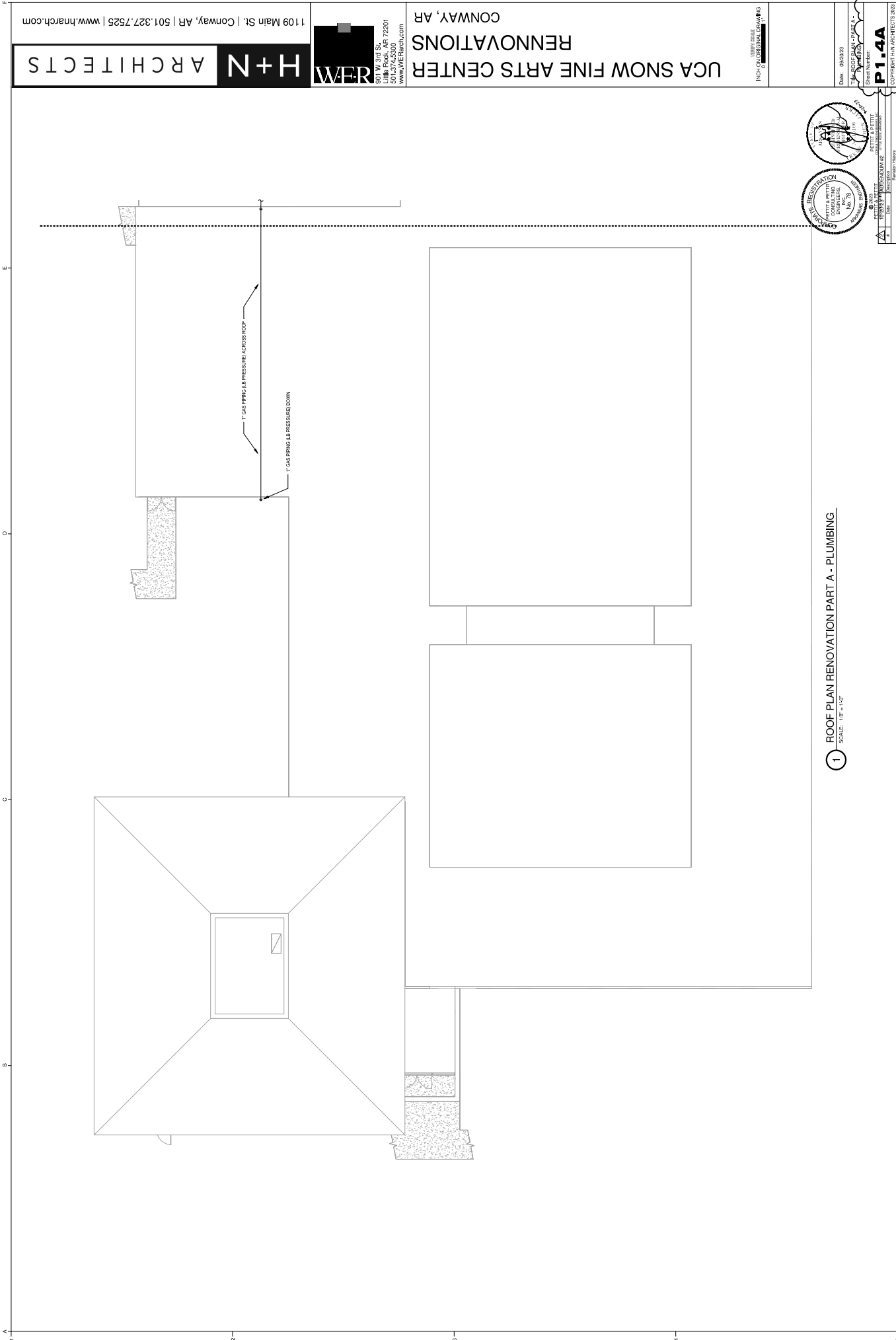
CLOSELY COORDINATE WITH ELECTRICAL CONTRACTOR FOR REMOVAL OF AIR HANDLERS.

3/4" GAS PIPING FROM ROOF

CLOSELY COORDINATE WITH ELECTRICAL CONTRACTOR FOR REMOVAL OF AIR HANDLERS.

3/4" GAS PIPING FROM ROOF

2 LEVEL 3 PLAN - RENOVATION PART B - PLUMBING
 SCALE: 1/8" = 1'-0"



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PLUMBING
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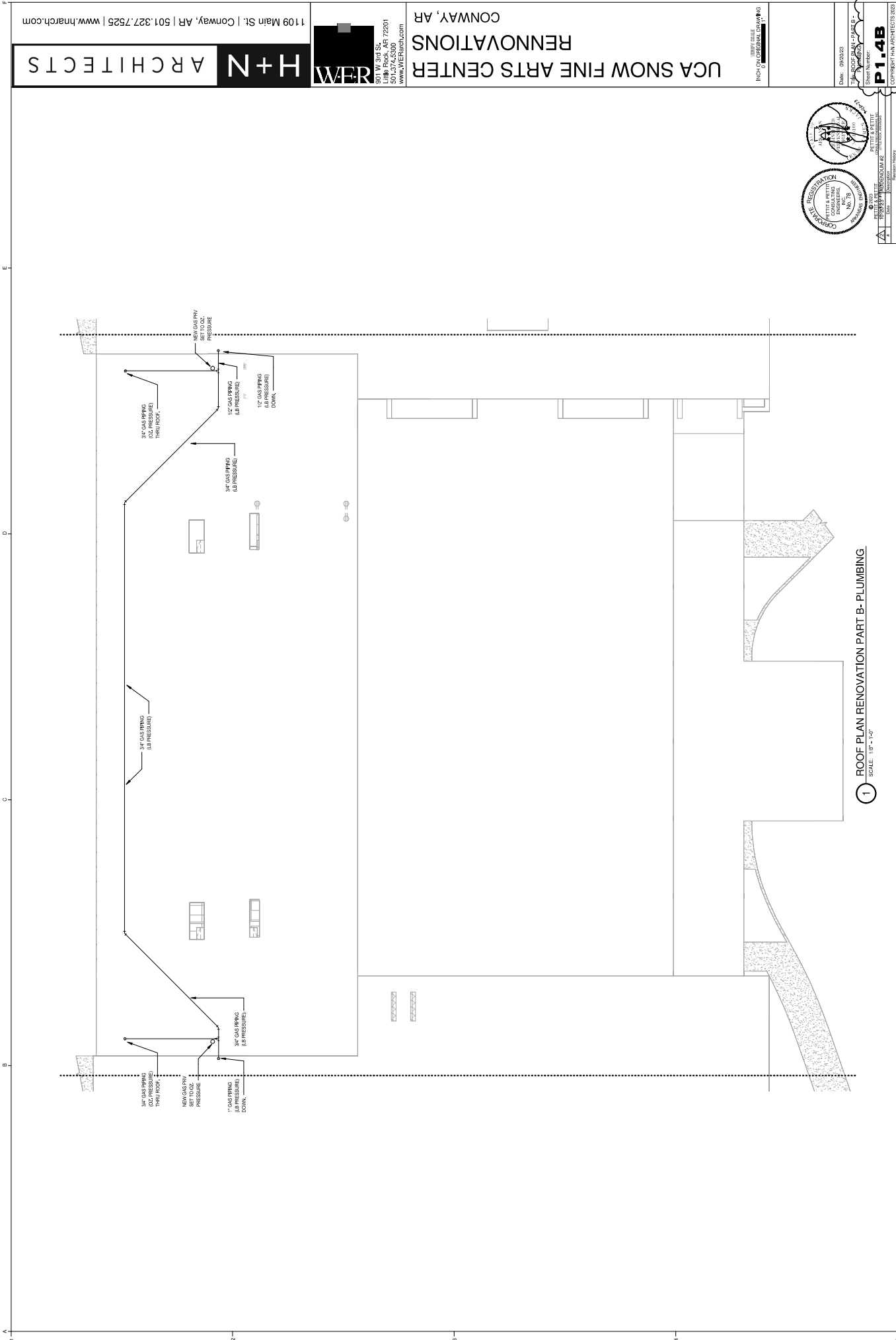
**UCA SNOW FINE ARTS CENTER
 RENOVATIONS**
 CONWAY, AR

DATE: 09/20/23
 RICH COLLEGE ARCHITECTURAL DRAWING



1 ROOF PLAN RENOVATION PART A - PLUMBING
 SCALE: 1/8" = 1'-0"

Date: 09/20/23
 Title: ROOF PLAN - PART A - PLUMBING
 Sheet Number: **P1.4A**
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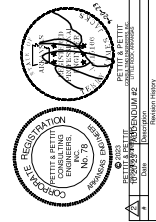
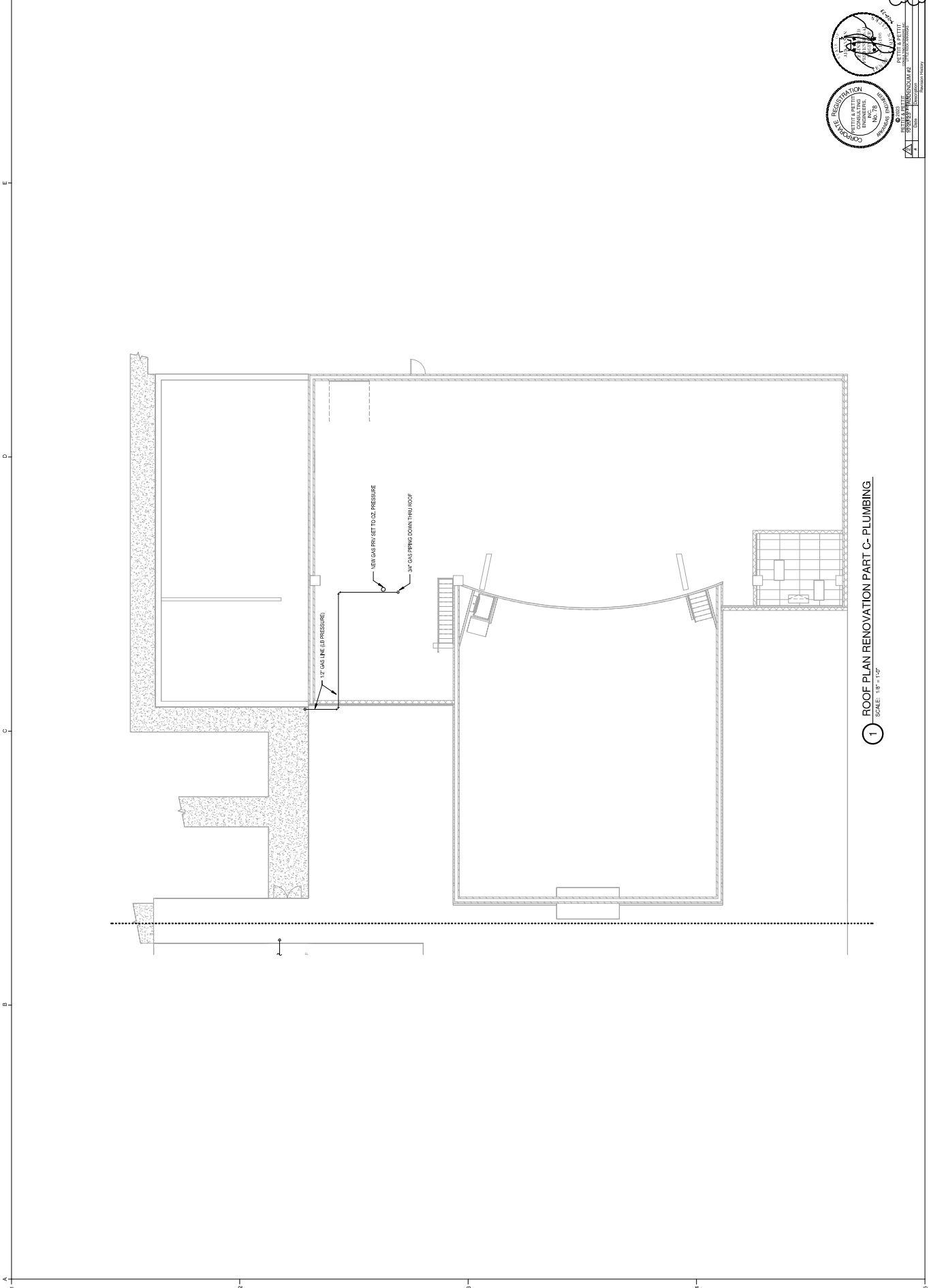
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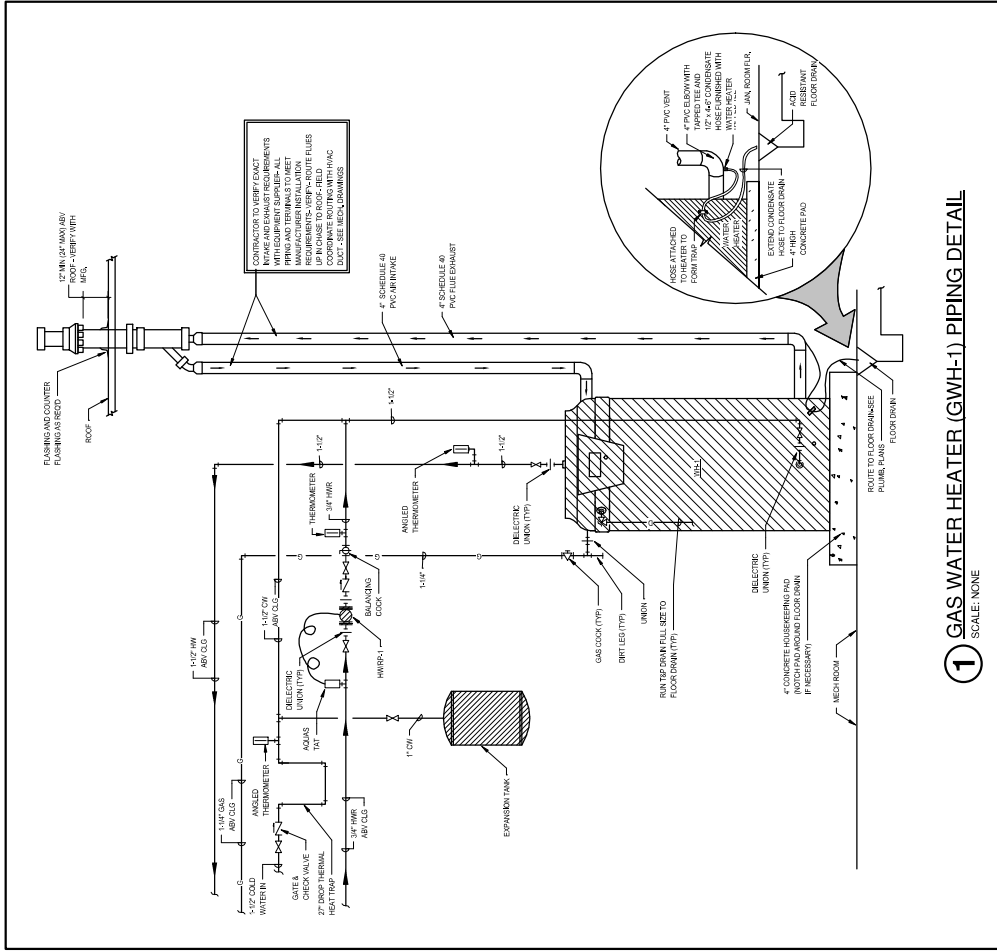
DATE: 09/20/23
 SHEET NUMBER: P1.4B
 PROJECT: UCA SNOW FINE ARTS CENTER RENOVATIONS
 DRAWING: PLUMBING



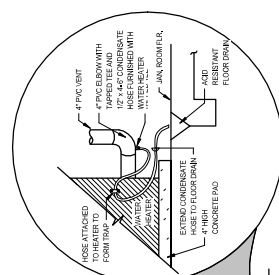
1 ROOF PLAN RENOVATION PART B- PLUMBING
 SCALE: 1/8" = 1'-0"



1 ROOF PLAN RENOVATION PART C- PLUMBING
 SCALE: 1/8" = 1'-0"

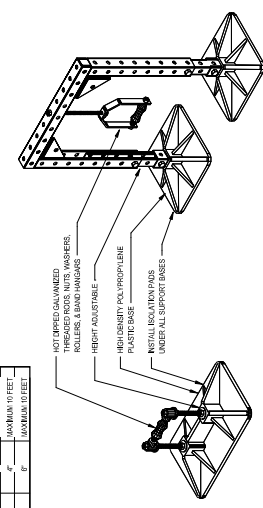


1 GAS WATER HEATER (GWH-1) PIPING DETAIL
SCALE: NONE



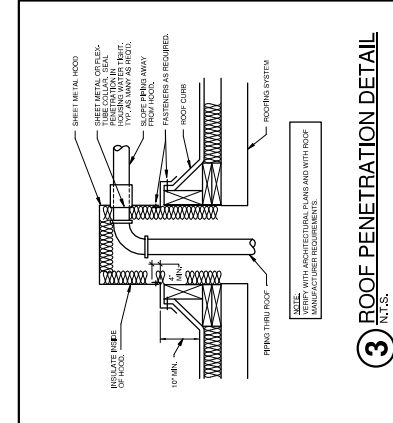
SUPPORTS AND RECOMMENDED SPACING

SUPPORT	PIPE SIZE	SPACING
SSP W/ ROLLER	3/4"	MAXIMUM 7 FEET
	1"	MAXIMUM 7 FEET
	1-1/2"	MAXIMUM 9 FEET
SSP W/ ROLLER	2-1/2"	MAXIMUM 10 FEET
	3"	MAXIMUM 10 FEET
	3-1/2"	MAXIMUM 10 FEET



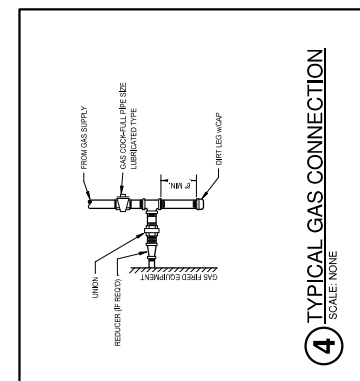
PIPE SUPPORT FOR GAS PIPING SMALLER THAN 1-1/2\"/>

2 ROOF GAS PIPING SUPPORT DETAIL
SCALE: NONE



SCALE: NONE
MANUFACTURER REQUIREMENTS

3 ROOF PENETRATION DETAIL
SCALE: NONE



4 TYPICAL GAS CONNECTION
SCALE: NONE

Date: 09/20/23
Sheet Number: P2-0
Project Name: UCA SNOW FINE ARTS CENTER RENOVATIONS
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