Project Name:	Council Rock School District HS North Natatorium Dehumidification and UV Replacement DEI Project No. 099729
Project Owner:	Council Rock School District 30 North Chancellor Street Newtown, PA 18940
Engineer:	CHA Consulting One East Broad St., Suite 310 Bethlehem, PA 18018

BID DUE DATE: Wednesday, February 26, 2025, at 2:00 p.m.

*This Addendum forms a part of the Contract Documents and modifies the original Bidding Documents dated **February 2024**. This addendum must be acknowledged on the Bid Form in the space provided for this purpose. Failure to so acknowledge this addendum may subject the Bidder to disqualification.*

1.0 GENERAL INFORMATION:

1.1 A building site visit has been scheduled for CRHS North for Friday, February 14, 2025, at 10:00 A.M. The meeting location is the Main Office. Please bring your driver's license for security purposes.

1.2 Additionally, site visits can be scheduled through CRSD. Please, contact Jessica Binda-Rischow at 215-944-1015 or email at jbinda-rischow@crsd.org. Contractors are required to check in at the building's main office upon arrival at the site.

1.3 **ALL BIDDERS are informed that only Addenda issued directly by CHA are a valid part of the Contract Documents. Addenda issued by other parties are invalid and should be disregarded.**

1.4 This addendum consists of fifty-four (54) pages including the following attachments:

- 2 Pages of revised and reissued Specification Section 011000, "Table of Contents"
- 6 Pages of revised and reissued Specification Section 004113, "Bid Form."
- 4 Pages of newly issued Specification Section 250533, "Electric Heat Tracing for Pipelines".
- 4 Pages of revised and reissued Specification Section 230993, "Sequence of Operations for HVAC Controls".
- 7 Pages of newly issued Specification Section 232300, "Refrigerant Piping".
- 17 Pages of revised and reissued Specification Section 238416A, "Natatorium Dehumidification Units".
- 1 Page of revised and reissued Drawing H0.1, "Cover Sheet".

- 1 Page of revised and reissued Drawing H1.2, “Roof Plan - Demolition”.
- 1 Page of revised and reissued Drawing H2.0, “Pool Filter Room”.
- 1 Page of revised and reissued Drawing H2.1, “Floor Plan”.
- 1 Page of revised and reissued Drawing H2.2, “Roof Plan”.
- 1 Page of revised and reissued Drawing H7.1, “Details”.
- 1 Page of revised and reissued Drawing H8.1, “Schedules”.
- 1 Page of revised and reissued Drawing H8.1, “Schedules.
- 1 Page of revised and reissued Drawing E3.0, “Pool Filter Room”.
- 1 Page of newly issued Drawing S1.1, “General Notes and Demo Plan”.
- 1 Page of newly issued Drawing S1.2, “New Equipment Support Framing Plan and Details”.

2.0 CHANGES TO PREVIOUS ADDENDA:

2.1 None.

3.0 CHANGES TO THE BIDDING REQUIREMENTS, CONTRACT FORMS, & CONDITIONS OF THE CONTRACT:

3.1 Specification Section 004113, “Bid Form” **DELETE** in its entirety and **REPLACE** with Specification Section 004113, “Bid Form” included with this Addendum No. 2.

4.0 CHANGES TO THE SPECIFICATIONS:

4.1 Specification Section 230600, “Facility Natural Gas Piping”, **DELETE** Specification Section in its entirety.

4.2 Specification Section 235100, “Breechings, Chimneys and Stacks” **DELETE** Specification Section in its entirety.

4.3 Specification Section 230993, “Sequences of Operation for HVAC Controls”, **DELETE** in its entirety and **REPLACE** with the attached Specification Section 230993A, “Sequences of Operation for HVAC Controls” included with this Addendum No. 2.

4.4 Specification Section 238416, “Natatorium Dehumidification Units”, **DELETE** in its entirety and **REPLACE** with the attached Specification Section 238146A, “Natatorium Dehumidification Units” included with this Addendum No. 2.

4.5 Specification Section 230533, “Electrical Heat Tracing for Pipelines”, **ADD** newly issued Specification Section included with this Addendum No. 2 to the project specifications.

4.6 Specification Section 232300 “Refrigerant Piping”, **ADD** newly issued specification included with this Addendum No. 2 to the project specifications.

4.7 Specification Section 230593, "Testing, Adjusting, and Balancing for HVAC", **REVISE** the following:

- Paragraph 1.2.A: "The following equipment shall be included in the scope of this section: Dehumidification Units DHU-1 and DHU-1 including supply air and outdoor airflow settings, hydronic coils, and pool water heat exchanger, and exhaust fans EF-1 and EF-2".

4.8 Specification Section 230713, "Duct Insulation", **ADD** the following:

- Paragraph 3.9: "OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE. A. Outdoor air-conditioning supply air and return-air ductwork shall be insulated with 2" thick polyisocyanurate rigid board insulation and shall be covered with .032" thick embossed aluminum jacket."

4.9 Specification Section 230719, "Pipe Insulation", **ADD** the following:

- Paragraph 3.12: " OUTDOOR PIPING INSULATION SCHEDULE. A. Outdoor hydronic piping, including hot water supply, hot water return, pool water supply, pool water return, and air-conditioning condensate drain piping, shall be heat traced and insulated with 2" thick mineral fiber pre-formed pipe insulation and shall be covered with .032" thick embossed aluminum jacket. Apply heat trace warning signs to jacket."

4.10 Specification Section 232113, "Hydronic Piping", **REVISE** the following:

- Paragraph 3.1.C from "Make-up Water Piping" to "AC Condensate Drain Piping"
- Paragraph 3.1.D from "Boiler Condensate Drain Piping" to "Pool Water Piping" Revise wall thickness from "Schedule 40 CPVC" to "Schedule 80 CPVC."

4.12 Specification Section 233113, "Metal Ducts", **REVISE** the following:

- Paragraph 3.7.A from "Fabricate ducts with galvanized sheet…" to "Fabricate ducts with aluminum sheet…"

5.0 CHANGES TO THE DRAWINGS:

5.1 Drawing H0.1, "Cover Sheet", **DELETE** in its entirety and **REPLACE** with the attached **Revision 1** Drawing dated February 13, 2025.

5.2 Drawing H1.2, "Roof Plan - Demolition", **DELETE** in its entirety and **REPLACE** with the attached **Revision 1** Drawing dated February 13, 2025.

5.3 Drawing H2.0, "Pool Filter Room", **ADD** the attached newly issued Drawing dated February 13, 2025 included with this Addendum No. 2.

5.4 Drawing H2.1, "Floor Plan", **DELETE** in its entirety and **REPLACE** with the attached **Revision 1** Drawing dated February 13, 2025.

5.5 Drawing H2.2, "Roof Plan", **DELETE** in its entirety and **REPLACE** with the attached **Revision 1** Drawing dated February 13, 2025.

5.6 Drawing H7.1, “Details”, **ADD** the attached newly issued Drawing dated February 13, 2025 included with this Addendum No. 2.

5.7 Drawing H8.1, “Schedules”, **DELETE** in its entirety and **REPLACE** with the attached **Revision 1** Drawing dated February 13, 2025.

5.8 Drawing E3.0, “Pool Filter Room”, **ADD** the attached newly issued Drawing dated February 13, 2025 included with this Addendum No. 2.

5.9 Drawing S1.1, “General Notes and Demo Plan”, **ADD** the newly issued Drawing dated February 13, 2025, included with this Addendum No. 2.

5.10 Drawing S1.2, “New Equipment Support Framing Plan and Details”, **ADD** the newly issued Drawing dated February 13, 2025, included with this Addendum No. 2.

6.0 BIDDERS QUESTIONS:

6.1 None.

NOTE:

- **ALL BIDDERS MUST indicate receipt of this Addendum on Page 1 of the Bid Form.**
- **No other acknowledgment is needed or requested to be returned as the receipt of Addenda is tracked through the ShareFile service Addenda are issued through.**

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COUNCIL ROCK SCHOOL DISTRICT
HIGH SCHOOL NORTH NATATORIUM DEHUMIDIFICATION & UV REPLACEMENT

Submitted To:

Council Rock School District

30 N. Chancellor Street

Newtown, PA 18940

Submitted By:

_____

_____

_____

THIS BID FORM SHALL NOT BE ALTERED IN ANY MANNER. ANY ALTERED BID FORMS SHALL BE CONSIDERED NON-RESPONSIVE AND WILL BE REJECTED.

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Contract Documents to complete all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the Contract Documents.

2. BIDDER accepts all of the terms and conditions of the Instructions to Bidders, including without limitation, those dealing with disposition of Bid Security. This Bid will remain open for 60 days after the day of Bid Opening unless the OWNER is delayed in awarding the Contract due to the failure to receive a required approval or permit from one or more reviewing bodies/governmental agencies having jurisdiction over the Project, the sale of bonds, or the award of a grant, in which case, Bids shall remain open for 120 days after the day of the Bid opening. BIDDER will sign the Agreement and submit the Contract Security and other documents required by the Contract Documents within ten (10) days after the date of OWNER'S Notice of Award.

3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

   a. BIDDER has examined copies of all Contract Documents, Advertisement to Bid, the Instructions to Bidders. BIDDER has reported any discrepancies, duplications, errors or omissions in the Contract Documents, as required in the Instructions to Bidders and hereby waives any claims for additional cost or time for such matters that were apparent or discoverable by BIDDER from a thorough and complete review of the Contract Documents prior to submission of this bid. Additionally, the BIDDER hereby acknowledges receipt of the following addenda:

      Addenda No. _____ _____ _____ _____ _____

   b. BIDDER has examined the site and locality where the Work is to be performed, the legal requirements (federal, state, and local laws, ordinances, rules and regulations) and the conditions affecting cost, progress or performance of the Work and has made such independent investigations, as BIDDER deems necessary. Failure to visit the project site shall be no reason for future request for additional compensation or costs of any kind.

   c. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, form, or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other BIDDER to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for BIDDER any advantage over any other BIDDER or OWNER.

4. The BIDDER agrees to perform the various items of Work for the following Single Lump Sum Price:

   BASE BID PROPOSAL:

   Single Prime Contract Base Bid Price (**INCLUDING** Project Allowances) for all work indicated on the Contract Documents.

   _____ Dollars.
   (Words)

   ($_____).
   (Figures)

5. **ALTERNATES:** The BIDDER agrees that the Owner shall have the right to accept or reject any or all of the following alternates, which acceptance or rejection shall enter into the determination of the low bidder. The BIDDER agrees that the contract time shall not be increased on account of the acceptance of any one or combination of alternates unless specifically stated in such Alternate descriptions. The BIDDER agrees that the Owner shall have the right to accept an alternate that is higher in price than the base bid or other alternate. Alternates Prices shall include the cost of furnishing, installing all materials, labor, tools, equipment and other incidentals necessary to complete the work in accordance with the design intent, manufacturers' recommendations, building codes and the project specifications. Do not adjust material allowance under any alternate bid items. Indicate whether alternate price is an add or deduct when a choice is provided.

   NONE (Alternate Removed)

6. **UNIT PRICES**: OWNER to make adjustments to the Contract based on the actual field conditions encountered using the Unit Prices included with the Bid. The BIDDER agrees that OWNER reserves the right to reject or otherwise not agree to use the Unit Prices submitted, if in the Owner's opinion, the nature or quantity of the work encountered is such that the unit price cost no longer applies to the Work. The Owner also reserves the right to solicit independent proposals as required by the Department of Education guidelines, under a separate contract to perform the services required. **The responsiveness of the Bid may be determined by the Owner on the basis of the Unit Prices proposed by the BIDDER. Unit prices shall be consistent with verifiable average costs for the work to be performed. Bidders agree that a proposal may be rejected if the Unit Prices submitted are inconsistent with the average cost.** Under NO circumstances will BIDDER perform Unit Price Work without prior written authorization from OWNER. Unit Prices shall include costs for furnishing and installing all materials, labor, tools, equipment, and other incidentals necessary to complete the specified operation. The BIDDER agrees that in the event of any inconsistency between a Unit Price and the extension of a Unit Price in a Material Allowance, the Unit Price shall control, and the Material Allowance extension shall be recalculated.

   UNIT PRICE 1: BIDDER agrees to provide additional miscellaneous fabricated and erected structural steel at the following unit price.

   The contract Unit Price per ton for Unit Price 1 is: $ _____per ton

UNIT PRICE 2: BIDDER agrees to provide insulated galvanized steel ductwork including hangars and accessories at the following unit price.

The contract Unit Price per pound for Unit Price 2 is: $ _____per pound

UNIT PRICE 3: BIDDER agrees to a flanged butterfly valve, including all fittings and accessories, in a 4" diameter black steel pipe at the following unit price.

The contract Unit Price per unit for Unit Price 3 is: $ _____per unit

UNIT PRICE 4: BIDDER agrees to replace, furnish, and install a Victaulic-type gasketed coupling fitting, including all accessories, in a 4" diameter black steel pipe at the following unit price.

The contract Unit Price per unit for Unit Price 4 is: $ _____per unit

UNIT PRICE 5: BIDDER agrees to provide a fully burdened roofer (composition) at the following unit price.

The contract Unit Price per hour for Unit Price 5 is: $ _____per hour

UNIT PRICE 6: BIDDER agrees to provide a fully burdened brick layer at the following unit price.

The contract Unit Price per hour for Unit Price 6 is: $ _____per hour

UNIT PRICE 7: BIDDER agrees to provide a fully burdened journeyman steamfitter (pipe fitter) at the following unit price.

The contract Unit Price per hour for Unit Price 7 is: $ _____per hour

UNIT PRICE 8: BIDDER agrees to provide a fully burdened journeyman sheet metal worker at the following unit price.

The contract Unit Price per hour for Unit Price 8 is: $ _____per hour

7. **PROJECT QUANTITY ALLOWANCE:** The Engineer must field measure and approve all allowance work prior to the Contractor performing the Work. Should the allowance amount be exceeded, the Contractor will be paid by Change Order addition at the Unit Price established for the related Work. Similarly, should be allowance amount be less than the allowed amount, the Contractor will credit the Owner for the unused quantity in accordance with the related Unit Price by a Change Order deduction.

BIDDER agrees to include in the Base Bid Price, in addition to the Work shown on the Drawings and Specifications the following:

Quantity Allowance 1:	Five (5) tons of Unit Price 1 work.
Quantity Allowance 2:	One thousand (1,000) pounds of Unit Price 2 work.
Quantity Allowance 3:	Two (2) units of Unit Price 3 work.
Quantity Allowance 4:	Twenty (20) units of Unit Price 4 work.
Quantity Allowance 5:	One hundred (100) hours of Unit Price 5 work.
Quantity Allowance 6:	One hundred (100) hours of Unit Price 6 work.
Quantity Allowance 7:	One hundred (100) hours of Unit Price 7 work.
Quantity Allowance 8:	One hundred (100) hours of Unit Price 8 work.

8. BIDDER accepts the provisions of the Agreement as to the liquidated damages in the event of failure to complete the Work by the date defined in Section 011000 – SUMMARY.

9. BIDDER understands that the OWNER reserves the unrestricted right to reject any and all bids. The Owner reserves the right to waive non-material defects, informalities, or technicalities in any Bid in accordance with law.

10. BIDDER understands that Owner reserves the right to consider Alternates Prices in determining the low bidder. All Alternate Prices shall include costs for furnishing and installing all materials, labor, tools equipment, and other incidentals necessary to complete the specified operation in accordance with the Project Specifications and the manufacturer's recommendations.

11. Accompanying this Bid is Security in the form of _____ in the amount of ten percent (10%) of the total of the Base Bid and all possible add alternates.

In witness whereof, the undersigned has caused this Proposal to be executed this _____ day of _____, 20_____.

INDIVIDUAL, PARTNERSHIP, LIMITED LIABILITY COMPANY, OR CORPORATION

_____
(Firm Name)

By _____
(Signature)

_____
Print or Type Name of Person Authorized to Sign (Title)

State of LLC or Incorporation _____

Business Address _____

_____

_____

Telephone Number (_____) _____

Cellular Number (_____) _____

Email Address* _____
**Provide email address(es) for Notices*

Attest by_____

_____
Print or Type Name of Person

Business / Corporate Seal:

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SECTION 230533 – ELECTRICAL HEAT TRACING FOR PIPELINES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Electric heat trace cables and controllers for insulated HVAC piping

1.3 SUBMITTALS

A. Product Data: For the following:
   1. Electric heat trace cables and controls
   2. Warning labels and signage

B. Shop Drawings:
   1. Detail installation instructions of assembly, components, hangers and securement for piping, valves, and fittings. Retain subparagraph below if products are required to withstand specific design loads and design responsibilities have been delegated to Contractor or if structural data are required as another way to verify products' compliance with performance requirements. Professional engineer qualifications are specified in Division 01 Section "Quality Requirements."

C. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain listed system components through one source from a single manufacturer.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Raychem Corporation “XL Trace” or approved equal.

2.2 MATERIALS

A. Self-regulating heater consisting of two (2) 16 AWG tinned-copper bus wires embedded in parallel in a self-regulating polymer core that varies its power output to respond to temperature all along its length, allowing the heater to be crossed over itself without overheating, and to be cut to length in the field. The heater shall be supplied with power connection, end seal, splice, and tee kits.

B. Cover: A radiation cross-linked modified polyolefin dielectric jacket.

C. Regulation: Self-regulating factor of at least 90 percent. The self-regulation factor is defined as the percentage reduction, without thermostatic control, of the heater output going from 40 DegF pipe temperature operation to 150°F pipe temperature operation.

D. The heater shall operate on line voltages of 208 volts without the use of transformers.

E. Control: Ambient-sensing thermostat (set at 40 DegF) with NEMA 4X enclosure, 10 foot stainless steel capillary with bulb. UL Listed. Thermostat to be Raychem AMC-F5 or equal.

F. Accessories: Power connection, end seal, splice and tee kits shall be Raychem "XLK."

PART 3 – EXECUTION

3.1 INSTALLATION

A. Size heaters according to the table illustrated below. The required heater output rating is in watts per foot at 50 DegF. (Heater selection based on 1-inch fiberglass insulation on metal piping).

PIPE SIZE	MINIMUM AMBIENT TEMPERATURES -10 DegF	-20 DegF
3-inch or less	5 watt	5 watt
4-inch	5 watt	5 watt
6-inch	8 watt	8 watt
8-inch	2 strips – 5 watt	2 strips - 8 watt
12- to 14-inch	2 strips – 8 watt	2 strips - 8 watt

B. Power Connection, end seal, splice, and tee kits components shall be assembled in the field.

C. Apply the heater linearly on the pipe after piping has been successfully pressure tested. Secure the heater to piping with cable ties or fiberglass tape.

D. Position bulb outside the building. Drill hole through wall of selected area in an inconspicuous location. Firmly attach bulb in place, using pipe strap and galvanized screws at a point as close to the bulb as possible. Run capillary tube alongside pipe back to thermostat locations, taping every 12 inches with glass tape.

E. Apply "electric traced" signs to the outside of the thermal insulation.

3.2 TESTS

A. After installation and before and after installing the thermal insulation, subject heat tracing to testing using a 1,000 VDC megger. Minimum insulation resistance shall be 20 to 1,000 megohms regardless of length.

END OF SECTION 230533

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SECTION 230993A - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 - PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Coordinate with HVAC Equipment Manufacturer for communication with factory mounted DDC controllers. Where HVAC equipment manufacturer's controls are proprietary, provide BACnet communication interface and programming. Provide additional on-site control start-up assistance for each HVAC unit including field verification of all setpoints and control points.

1.2 SUMMARY

A. This Section includes control sequences for HVAC systems, subsystems, and equipment.

B. Related Sections include the following:
1. Division 23 Section 2030900 "Instrumentation and Control for HVAC" for control equipment and devices and for submittal requirements.
2. Division 238416 Section "Natatorium Dehumidification Units" for field mounted controls and unit manufacturers BMS communication interfaces.

1.3 DEFINITIONS

A. DDC: Direct Digital Control.

B. BAS: Building Automation System (aka, BMS)

C. BMS: Building Management System

D. FMS: Facility Management System (aka, BMS)

E. VAV: Variable air volume.

1.4 HVAC SEQUENCES OF OPERATION – BASIC SCOPE

A. Alter and extend the existing Building Management System (BMS) for control, monitoring, and alarming of the proposed HVAC equipment and systems as depicted on the drawings and as specified herein.
1.
2.
3. Portions of the existing building management system may remain in place to serve existing HVAC systems or equipment which is not replaced under the scope of this project. Where existing HVAC equipment is indicated to be replaced, provide new DDC controls,

electronic valve and damper actuation, communication trunk, main network control panels, and all associated wiring, software, programming, graphics, and technical support.

4.
   a. Prior to commencing demolition and removal of existing HVAC equipment, conduct a site survey with the Mechanical Contractor to identify existing controls which are intended to remain in place upon project completion. Label and mark all devices, wiring, and related components which are intended to remain. Remove all un-used or un-needed components; remove all obsolete components. Do not abandon un-used control components or wiring in place. Remove obsolete wiring back to mains or local sources. Cut and terminate wiring that is buried in wall or ceiling construction that is not accessible for complete removal.
   b. Prior to commencing construction, prepare an as-built drawing depicting the location, make, and parts lists of control devices associated with this project and intended to remain or to be altered. Submit as-built documentation to the project engineer.
   c. Provide temporary protection for all existing control equipment and wiring intended to remain.

B. The following control sequences are included herein:
   1. Natatorium Dehumidification Units including associated exhaust fans, hydronic control valves, and air-cooled condensers.

1.5 COORDINATION

A. BMS Contractor shall coordinate the installation of his controls, sensors, valves, actuators, safeties, and wiring are installed in full compliance with the equipment manufacturer's installation instructions and supplemental instructions.
   1. Coordinate with the equipment manufacturer to determine the extent and termination of factory mounted controls and integration with field mounted devices. Coordinate the mounting location within equipment control cabinets.
   2. Where control sequences are specified herein and appear to conflict with the equipment manufacturer's control sequences, the equipment manufacturer's sequences shall prevail. Alert the Engineer to any and all deviations.
   3. DO NOT override, remove, or alter equipment manufacturer's safety devices including all associated sensors, wiring, lockouts, or sequences of operation.

B. Where HVAC equipment manufacturers' factory mounted microprocessor or programmable controller are utilized, including all associated sensors, valves, actuators, and wiring, provide communication with the equipment manufacturer's BACnet interfaces.
   1. Install the equipment manufacturer's remote sensors and auxiliary control devices where furnished by the manufacturer.
   2. Obtain a points list from the equipment manufacturer. Display all points, warnings, and alarms on the BMS.
   3. Coordinate in the field with the manufacturer's authorized control technician to ensusre all points are properly communicated and displayed on the BMS.

C. The BMS Contractor is responsible for extending power wiring, including 120V power supply, from existing sources to his control devices. All power wiring shall be installed in conduit.

D. Coordinate the final location of controls, dampers, sensors, immersion wells, and similar devices with the Mechanical Contractor.

1.6 GENERAL

A. Occupancy Schedule: Coordinate occupancy schedules with the Owner to determine day-to-day operations.

1.7 NATATORIUM DEHUMIDIFICATION UNITS AND VENTILATION FANS

A. Natatorium Dehumidification Units (DHU-1, DHU-2) are factory equipped with unit manufacturer's DDC controller for control and operation of all primary heating, cooling, dehumidification, ventilation, ventilation heat recovery, refrigerant cycle heat rejection, and pool water heating modes of operation. Provide the following asssoicated work:
   1. Furnish and install a modulating 2-way hot water control valve for each DHU. Valve actuator shall match unit manufacturer's control output specifications. Valve shall fail open.
   2. Field mounting and wiring of DHU manufactures remote mounted sensors including:
      a. Remote mounted Interface Panel
      b. Space temperature and humidity sensors
      c. Space VOC sensors
      d. Space differential pressure sensors
      e. Pool water temperature sensors
      f.
   3. Field wiring to:
      a. Remote air-cooled condensers ACC-1, ACC-2
      b. Duct smoke detectors,
      c. Remote, variable speed, Engergiexhaust fans (EF-1, EF-2)
      d.
   4. Communication and control wiring to manufacturer's controller for:
      a. BMS BACnet communications
      b. Auxiliary alarm contacts
      c.
   5. Coordination and programming of setpoints and occupancy schedules with unit manufacturer and owner

B. Exhaust Fans EF-1, EF-2:
   1. Energize each exhaust fan for continuous operation during the normally occupied period. Fans are variable speed; coordinate fan speed setpoint with the testing and balancing agent for constant exhaust airflow at the specified rate.
   2. Enable DHU-1, DHU-2 outdoor air damper to open to minimum. DHU-1, DHU-2 internally exhaust fans shall modulate to maintain space pressure setpoint.
   3. Exhaust fans shall de-energize during the unoccupied periods; DHU-1, DHU-2 outdoor air damper shall close.

C. DHU-1, DHU-2 Purge Exhaust
   1. Enable DHU-1, DHU-2 to operate in a purge exhaust mode upon VOC detection setpoint activation.
      a)

D. Provide BACnet communication with the DHU manufacturer's controller and display the following on the BMS workstation for each unit:
    a. System graphic
    b. Occupancy Schedule
    c. Outside air temperature and relative humidity
    d. EF status
    e. DHU status including:
        1) Space temperature and relative humidity
        2) Discharge air temperature
        3) Outdoor ventilation mode
        4) Economizer mode
        5) Refrigerant mode/status (cooling, dehumidification, heat recovery)
        6) Pool water heating mode/status
        7) Heating status (including valve position)
        8) VOC status
        9) Dirty filter indication

E. Indicate an alarm on the BMS for the following:
    a.
    b. Space temperature, low temperature alarm (below 75F)
    c. Freezestat trip
    d. Unit alarm/fault shut-down indication.
    e.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 230993

SECTION 232300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

1.3 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-454B:
   1. Hot-Gas and Liquid Lines: 600 psig.

1.4 SUBMITTALS

A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data.

B. Installer’s Certificates signed by Contractor certifying that technicians comply with requirements specified under "Quality Assurance" below.

C. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

B. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.6 PRODUCT STORAGE AND HANDLING

A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

1.7 COORDINATION

A. Coordinate size and location of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B 280, Type ACR.

B. Wrought-Copper Fittings: ASME B16.22.

C. Wrought-Copper Unions: ASME B16.22.

D. Brazing Filler Metals: AWS A5.8.

2.2 JOINING MATERIALS

A. Brazing Filler Metals: Construct joints according to AWS A5.8.
1. Use Type BCuP (copper-phosphorus) alloy for joining copper socket fittings with copper pipe.
2. Use BAg (cadmium-free silver) alloy for joining copper with bronze or steel.

2.3 VALVES AND SPECIALTIES

A. General: Complete valve assembly shall be UL listed and designed to conform to ARI 760.

B. Globe: 450-psig maximum operating pressure, 275 DegF maximum operating temperature; cast bronze body, with cast bronze or forged brass wing cap and bolted bonnet; replaceable resilient seat disc; plated steel stem. Valve shall be capable of being repacked under pressure. Valve shall be straight through or angle pattern, with solder end connections.

C. Check Valves Smaller than 7/8 inch: 500-psig maximum operating pressure, 300 DegF maximum operating temperature; cast brass body, with removable piston, Teflon seat, and stainless steel spring; straight through globe design. Valve shall be straight through pattern, with solder end connections.

D. Check Valves 7/8 inch and Larger: 450-psig maximum operating pressure, 300 DegF maximum operating temperature; cast bronze body, with cast bronze or forged brass bolted bonnet; floating piston with mechanically retained Teflon seat disc. Valve shall be straight through or angle pattern, with solder end connections.

E. Solenoid Valves: 250 DegF temperature rating, 400-psig working pressure; forged brass, with Teflon valve seat, 2 way straight through pattern, and solder end connections. Provide manual

operator to open valve. Furnish complete with NEMA 1 solenoid enclosure with 1/2-inch conduit adapter, and 24 volts, 60 Hertz, normally closed holding coil.

F. Evaporator Pressure Regulating Valves: pilot operated, forged brass or cast bronze; complete with pilot operator, stainless steel bottom spring, pressure gage tappings, 24 VDC, 50/60 Hertz, standard coil; and wrought copper fittings for solder end connections.

G. Thermal Expansion Valves: thermostatic adjustable, modulating type; size as required for specific evaporator requirements, and factory set for proper evaporator superheat requirements. Valves shall have copper fittings for solder end connections; complete with sensing bulb, a distributor having a side connection for hot gas bypass line, and an external equalizer line.

H. Hot Gas Bypass Valve: adjustable type, sized to provide capacity reduction beyond the last step of compressor unloading; and wrought copper fittings for solder end connections.

2.4 REFRIGERANT PIPING SPECIALTIES

A. General: Complete refrigerant piping specialty assembly shall be UL listed and designed to conform to ARI 760.

B. Strainers: 500-psig maximum working pressure; forged brass body with monel 80 mesh screen, and screwed cleanout plug; Y pattern, with solder end connections.

C. Moisture/liquid Indicators: 500-psig maximum operation pressure, 200 DegF maximum operating temperature; forged brass body, with replaceable polished optical viewing window, and solder end connections.

D. Filter driers: 500-psig maximum operation pressure; steel shell, flange ring, and spring, ductile iron cover plate with steel capscrews, and wrought copper fittings for solder end connections. Furnish complete with replaceable filter drier core kit, including gaskets, as follows:

E. Standard capacity desiccant sieves to provide micronic filtration.

F. High capacity desiccant sieves to provide micronic filtration and extra drying capacity.

G. Suction Line Filter Drier: 350-psig maximum operation pressure, 225 DegF maximum operating temperature; steel shell, and wrought copper fittings for solder end connections. Permanent filter element shall be molded felt core surrounded by a desiccant for removal of acids and moisture for refrigerant vapor.

H. Suction Line Filters: 500-psig maximum operation pressure; steel shell, flange ring, and spring, ductile iron cover plate with steel capscrews, and wrought copper fittings for solder end connections. Furnish complete with replaceable filter core kit, including gaskets, as follows:

I. Flanged Unions: 400-psig maximum working pressure, 330 DegF maximum operating temperature; two brass tailpiece adapters for solder end connections to copper tubing; flanges for 7/8-inch through 1 5/8-inch unions shall be forged steel, and for 2 1/8-inch through 3 1/8-

inch shall be ductile iron; four plated steel bolts, with silicon bronze nuts and fiber gasket. Flanges and bolts shall have factory applied rust resistant coating.

J. Flexible Connectors: 500-psig maximum operating pressure; seamless tin bronze or stainless steel core, high tensile bronze braid covering, solder connections, and synthetic covering; dehydrated, pressure tested, minimum 7 inches in length.

2.5 REFRIGERANTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Atofina Chemicals, Inc.
   2. DuPont Company; Fluorochemicals Div.
   3. Honeywell, Inc.; Genetron Refrigerants.
   4. INEOS Fluor Americas LLC.

B. ASHRAE 34, R-454B

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-454B

A. Hot-Gas and Liquid Lines NPS 1-1/2 and smaller: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with brazed joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

A. Install valving and specialties per equipment manufacturer’s recommendations.

B. Install filter dryers in liquid line between compressor and thermostatic expansion valve.

3.3 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Refer to Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls" for solenoid valve controllers, control wiring, and sequence of operation.

K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

L. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Division 08 Section "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

M. Install refrigerant piping in protective conduit where installed belowground.

N. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

O. Slope refrigerant piping per equipment manufacturer’s recommendations.

P. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

Q. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

R. Identify refrigerant piping and valves according to Division 23 Section "Identification for HVAC Piping and Equipment."

3.4 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
   1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
   2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

3.5 HANGERS AND SUPPORTS

A. Hanger, support, and anchor products are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

B. Install the following pipe attachments:
   1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
   2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
   3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
   4. Spring hangers to support vertical runs.
   5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:
   1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
   2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
   3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
   4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
   5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.

D. Support multifloor vertical runs at least at each floor.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:
   1. Comply with ASME B31.5, Chapter VI.
   2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
   3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.
      a. Fill system with nitrogen to the required test pressure.
      b. System shall maintain test pressure at the manifold gage throughout duration of test.

c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.7 SYSTEM CHARGING

A. Charge system using the following procedures:
1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
4. Charge system with a new filter-dryer core in charging line.

3.8 ADJUSTING

A. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

B. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.

C. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
1. Open shutoff valves in condenser water circuit.
2. Verify that compressor oil level is correct.
3. Open compressor suction and discharge valves.
4. Open refrigerant valves except bypass valves that are used for other purposes.
5. Check open compressor-motor alignment and verify lubrication for motors and bearings.

D. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 232300

SECTION 238416A - NATATORIUM DEHUMIDIFICATION UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes packaged, factory-assembled and -tested, Natatorium (enclosed swimming pool) environmental control/ energy recovery/ dehumidification units designed for outdoor rooftop installation.

B. Equipment includes Dehumidification units with refrigerant compressors, direct expansion cooling coils and reheat coils, hot water heating coils, and remote outdoor air-cooled condenser. Units shall be complete with variable speed supply air fans and exhaust air fans, variable frequency drives, air filters, outdoor air dampers, return air dampers, and exhaust air dampers. Units shall include factory mounted control cabinet equipped with DDC controls and building management (BMS) communications.

C. Provide a complete, operable, adjusted natatorium dehumidification system as shown and having the capacity and performance as scheduled on the drawings including:
   1. Installation of rooftop units to be mounted on structural steel frame, including vibration isolators.
   2. Installation of remote-air cooled condensers, roof curbs, refrigerant piping, and control wiring
   3. Installation of hot water heating piping, control valve, and hydronic valves and specialties.
   4. Installation of pool water heating piping (applicable to DHU-1 only)
   5. Installation of condensate drain piping.

1.3 ACTION SUBMITTALS

A. Product Data: For each dehumidification unit indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For each dehumidification unit indicated. Include plans, elevations, sections, details, and attachments to other work.
   1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   2. Wiring Diagrams: For power, signal, and control wiring.

C. Delegated-Design Submittal: For dehumidification units indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   1. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
   2. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.

1.4 INFORMATIONAL SUBMITTALS

A. Source quality-control reports.

B. Field quality-control reports.

C. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For dehumidification units to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Filters: One set(s) of each type of filter specified.
   2. Fan Belts: One set(s) for each belt-drive fan.

1.7 QUALITY ASSURANCE

A. The complete unit shall be listed by an industry recognized, third-party, safety code agency under the title of "Special Purpose Air Conditioners" and carry the appropriate label.

B. The system shall be completely assembled, wired, piped, and test-run at the factory prior to shipping. All controls shall be factory adjusted to satisfy the design conditions.

C. The unit shall be ETL listed.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. ASHRAE Compliance:
   1. Applicable requirements in ASHRAE 62.1, Section 5, "Systems and Equipment" and Section 7, "Construction and Startup."
   2. Applicable requirements in ASHRAE 15, "Safety Standard for Refrigeration Systems."

F. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6, "Heating, Ventilating, and Air-Conditioning."

G. Unit shall be completely factory assembled, wired, piped, and test run prior to shipping. All controls shall be factory adjusted and preset to the design conditions. A factory test report shall be available upon request.
   1. All necessary temperature, humidity, VOC and differential pressure sensors intended for field mounting by the Mechanical Contractor shall be furnished by the equipment manufacturer. Provide complete installation instructions and wiring specifications.
   2. Coordinate hydronic control valve actuator requirements with the Mechanical Contractor.

H. The unit shall have a mechanical vestibule where the electrical panel, compressors, pool water heat exchangers, receivers and most of the refrigeration controls are out of the process air stream.

I. Unit shall have a microprocessor controller with unit mounted refrigerant pressure transducers on each independent compressor circuit, air pressure switches across filters and coils, multiple temperature sensors.

J. The unit shall have 24-7 remote computer monitoring with automated alarm notifications and system performance alerts with communication to the existing building management system.
   1. Coordinate Building Management System communication protocol with the Owner’s existing BMS company.

1.8 COORDINATION

A. Coordinate installation of equipment supports and vibration isolators with existing structural steel conditions or new steel framing systems.

1.9 WARRANTY

A. Warranty: The entire unit shall have a 24 month parts and labor warranty from ship date. This warranty shall include refrigerant.

B.
   1. The compressor(s) shall have a 5 year warranty from ship date.
   2. The internal airside coils shall have a 10 year pro-rated warranty from ship date.
   3. Fan drive lines shall have a 5 year pro-rated warranty from ship date.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Desert Aire (Basis of Design Mfr)

2. Seresco
3. Dectron
4. Poolpak
5.
6. Contractor attention called to the installation of units other than the Basis of Design Manufacturer may necessitate additional alterations to structural steel supports and electrical power distribution. Contractor shall include all associated alterations in his bid.

2.2 General

A. The natatorium control system shall include:
1. Mechanical process dehumidification
2. Outdoor air/exhaust air heat recovery module.
3. Outdoor air economizer for free cooling/dehumidification.
4. Packaged outdoor air-cooled condenser for AC heat rejection
5. A hydronic heating coil sized for ventilation and space heating loads.
6. Pool water heat exchanger (DHU-1 only)
7. Air filtration via MERV-13 pleated panel filters for return
8. Purge exhaust and economizer control modes including control output to remote variable speed exhaust fans and space pressurization control.
9. A service vestibule where the compressor, refrigeration specialties, control valves and all electronics are outside of process air stream
10. A single point power connection and factory wiring to all fans, compressors, and control circuit transformers. Factory wiring to all internal control components and devices.
11. Programmable microprocessor controller with touch display and live, 24-7 remote internet access, monitoring and control.
12. BacNet interface for communication with the existing Johnson Controls building management and control system.

2.3 Cabinet

A. The Cabinet shall be designed for Outdoor installation and shall be internally insulated.

B. All cabinet sheet metal, base rails and supports, corner posts, top panels, and removable side panels shall be 16 gauge galvanneal steel. All metal parts shall be cleaned and pretreated prior to painting. Paining shall be a powder coated with a high yield polyester finahis. Pain shall be rated to comply with a 1000 hours salt spray test in accordance with ASTM B117 and impact resistance in accordance with ASTM D2794.

C. Insulation: The unit shall be insulated with engineered polymer closed-closed cell foam insulation (EPFI), ¾" minimum thickness, and shall comply with the following standards:
1. NFPA 255 Flame Spread, maximum 25; Smoke Developed, maximum 50; and Fuel Contribution, 0.
2. NFPA Standard 90A (2-2.4.2) and 90B.
3. ASTM C5118 Thermal Resistance, ASTM C411 Hot Surface Performance, ASTM C423 Sound Attenuation, ASTM C665 Fungi Resistance, ASTM 1136 Mold and Moisture Resistance.
4. UL 94HBF Horizontal Burn, and UL 181 Air Erosion and Mold Growth.

D. Cabinet configuration shall include:
   1. A filter rack with separate access doors shall be provided for the return air and minimum outdoor air streams.
   2. Service compartments for compressors, blower motors, receiver, solenoid valves and the electrical panel in a separate compartment out of the processed air stream. All components shall be serviceable while the unit is in operation.
   3. Electrical panel: The unit shall have a built-in electrical control panel in a separate compartment in order not to disturb the airflow within the dehumidifier during electrical servicing. All electrical components shall be mounted on a 16 gauge galvanized sub-panel.

2.4 Refrigeration System

A. The refrigeration system shall be fully charged and designed to operate with R-454B.

B. Compressors shall be dual circuit, heavy-duty scroll-type. Compressors shall be mounted on vibration isolators.

C. Refrigeration circuit shall have pressure transducers monitoring the refrigerant high and low pressures. The refrigeration circuit shall be accessible for diagnostics, adjustment and servicing without the need of service manifold gauges.

D. Refrigerant circuits shall have solenoid control valves, check valves, a liquid line filter drier, liquid and moisture indicator, thermostatic expansion valve and pump down solenoid valve.

E. Unit shall have an externally adjustable balanced port design mechanical thermostatic expansion valve.

F. Refrigerant receiver shall have rotolock service valves. The receiver shall be sized for full-system refrigerant capacity to allow system pump down, and for operating at the highest efficiency over a wide range of load conditions.

2.5 Coils

A. Evaporator/dehumidifier coils shall be designed for maximum moisture removal capacity.
   1. Fins shall be die-formed aluminum and shall be damage resistant. Extruded fin collars shall be design for maximum heat transfer. Fin spacing shall not exceed 10 FPI. Coils shall be designed to prevent moisture carry-over and re-evaporation into the air stream.
   2. Tubes shall be fabricated from seamless drawn and shall be mechanically expanded into the fins to form a permanent metal-to-metal bond.
   3. Each coil shall have a drain pan.
   4. Coils shall be factory leak tested to 420 psig.

B. Reheat Coils shall be positioned a minimum of 5” from evaporator coils to prevent water re-evaporation.
   1. Fins shall be die-formed aluminum and shall be damage resistant. Extruded fin collars shall be design for maximum heat transfer. Fin spacing shall not exceed 12 FPI

2. Tubes shall be fabricated from seamless drawn and shall be mechanically expanded into the fins to form a permanent metal-to-metal bond.
3. Coils shall be factory leak tested to 420 psig.

C. Hot Water Heating Coils shall be factory installed.
1. Fins shall be die-formed aluminum and shall be damage resistant. Extruded fin collars shall be design for maximum heat transfer. Fin spacing shall not exceed 14 FPI
2. Tubes shall be fabricated from seamless drawn and shall be mechanically expanded into the fins to form a permanent metal-to-metal bond.
3. Coils shall be factory leak tested to 315 psig.
4. Coils shall be protected with freeze-protection safeties that shall de-energize the unit, close outdoor air dampers, and fully open hot water control vavles.

D. Coil Coatings
1. All air-side refrigerant coils shall be coated with a corrosion inhibitor. The coating shall be applied after coils are assembled and shall cover finds, tubes, headers, and sheet metal casings.
2. Coils shall be fully coated for maximum corrosion protection and shall have a minimum dry film thickness of 0.6 to 1.2 mills per ASTM D7091.

E. Coils shall have a 5-year warranty.

2.6 Pool Water Condenser (Applicable to DHU-1)

A. Pool water refrigerant-to-water condenser shall be double wall, tube-in0-tube, cupronickel construction with CPVC piping connections. Heat exchanger shall be rated for potable water applications and include weep holes for visual indication of tube failure.

2.7 Air-Cooled Condensers

A. Air-cooled condensers shall be designed for full heat rejection capacity of the units refrigerant compressors and circuits. Unit cabinets shall be constructed of galvanized steel. Copper tube coils shall be mechanically expanded into aluminum plate fins. Coils shall be factory leak tested.

B. Fans shall be direct drive with heavy duty PSC motors. all motors, electrical terminations, and control terminations shall be weatherproofed. Fans shall be equipped with heavy gauge wire guards.

2.8 Drain Pans

A. Each evaporator coil shall be provided with a positive draining, compound-sloped, 20-gauge stainless steel drain pan with fully-welded corners to ensure zero water retention. Drain pans shall comply with ASHRAE Standard 62.

B. 2.7 Fans

C. Supply Fans:
1. Supply fans shall be belt drive, utilizing either double inlet forward curved or air foil centrifugal wheels. Housings shall be constructed from galvanized steel. Fans wheels shall have corrosions resistant coatings. All fans shall be statically and dynamically balanced.
2. Bearings shall be L50 Lifetime, 200,000 hours.
3. Blower driver pulley and blower pulley shall be cast iron. Motor sheave shall be variable pitch.
4.
5. an impeller plenum fan complete with backward curved, three-dimensional profiled

D. Exhaust blowers:
1. Exhaust fans shall be direct drive plenum fans sized to maintain the negative pressure requirement in the space during normal operation. Fan impellers shall be constructed with high strength composite.
2. Fan motors shall be variable speed electronically commutated (EC) with integral rectifier and electronics.
3. Bearings shall be L40 Lifetime, 40,000 hours.

2.9 Outdoor Air / Exhaust Air Heat Recovery System

A. Units shall be equipped with an integral fresh air /exhaust air heat recovery system for introduction of space ventilation air. The exhaust air shall be exhausted from either before or after the evaporator coil, provide the ability to extract energy from the return air. Energy shall be recovered by directing exhaust air through the evaporator coil in a cooling/heat pump refrigeration mode. Heat recovery module shall include outdoor air intake hood.

2.10 Filters

A. Filters shall be standard sized, replaceable, off-the-shelf filters used throughout including:
1. 2-Inch MERV 13, 90% pleated filters with rust-free non-metallic structure

2.11 Dampers

A. Internal dampers shall be opposed blade and made from extruded anodized Aluminum with neoprene double seal tips s to minimize leakage. Damper blades shall be mounted on steel rods which rotate on nylon bushings. All damper hardware shall be corrosion resistant.

B. Unit shall be provided with a power open and spring return outside air and exhaust air dampers. Dampers adjust between 0% to 100% open position.

C. Outdoor air and exhaust air dampers shall be opposed blade, power open and spring return. Dampers blades shall have 0.75-inch insulated type made from extruded anodized aluminum with neoprene double seal tips to minimize leakage. Damper leakage shall be less than 1% of maximum flow at 4-inch W.C. differential. Damper blades shall be mounted on steel rods which rotate on nylon bushings. All damper hardware shall be corrosion resistant.

2.12 Air Cooled Condenser

A. Unit shall be supplied with a remote air-cooled condenser where excess compressor heat is rejected to the outdoors. The remote outdoor air-cooled heat exchanger shall both be capable of rejecting 100% of the compressor heat rejection with an air on temperature at summer design conditions. The outdoor heat exchanger shall be equipped with a 24VAC control including contactor for fan motor.

B. The remote air-cooled heat exchanger coils shall have copper tubes expanded onto aluminum fins. Coils shall be tested at 425 PSIG and mounted vertically for complete surface utilization. Coils shall be counter flow and have adequate capacity to dissipate the total heat rejection of the system at design conditions. Fans shall have guards to protect the coils from external damage.

C. Fans shall be direct driven by NEMA constructed, three phase motors operating at 1140 RPM. Each motor shall have a shaft slinger to prevent water seepage into the motor.

2.13 Pool Water Heater

Potable water rated coaxial heat exchanger shall be double-wall vented construction with corrosion-resistant cupro-nickel water circuit tubing

A. Self-purging and self-draining counter flow design

B. Water circuit piping shall consist of transparent braided PVC hose

C. Terminating connections are PVC schedule 40 NPT fittings located at the cabinet wall for easy connection

D. The maximum loop operating pressure is 60 psig

2.14 Control Panel

A. Electrical contractor shall be responsible for external power wiring and disconnect switch fusing. Power block terminals shall be provided.

B. The system shall include a factory-installed fused disconnect

C. The system shall be mounted inside the service vestibule outside of the process air stream.

D. Blower motors shall be protected with thermal trip overloads.

E. Unit shall have a voltage monitor with phase protection.

F. Available dry contacts shall include:
1. Alarm
2. Blower interlock
3. Stage 1 & 2 heating
4. Outdoor air damper control

5. Exhaust fan(s)
6. Outdoor-air cooled equipment
7. System on
8. Auxiliary pool heater 1
9. Heat recovery

G. Terminals shall be provided for 24 volt power to the outdoor air cooled fluid cooler fan contactor.

H. All wiring shall be installed in accordance with UL or CSA safety electrical code regulations, and shall be in accordance with NFPA. All components used shall be UL or CSA listed.

I. Color-coding and wire numbering shall be provided for easy troubleshooting. All wires shall be in a wire duct. Wiring diagrams located near electrical panels on unit.

J. Compressors shall have a time delay start to prevent short cycling.

K. Pressure transducers for refrigerant high pressure and suction pressure shall be provided.

L. Airflow switch and dry contact for alarm shall be provided.

2.15 Microprocessor Control

A. A microprocessor controller with the following characteristics will be provided:
1. All set points and adjustments are preprogrammed at the factory during quality control and test operation.
2. A real time clock to time stamp unit operation log with programmable 7-day occupied/unoccupied scheduling capabilities.
3. Keypad and display panel shall have a backlit graphic liquid crystal display.

B. Unit shall have pressure transducers monitoring the refrigerant high and low pressures. The refrigeration circuit shall be accessible for diagnostics, adjustment and servicing without the need of service manifold gauges.

C. The following status LEDs shall be on the controller:
1. Alarm - indicates there has been a failure requiring service.
2. Dehumidification - indicates that the system is dehumidifying the space.
3. Cooling - indicates that the air-conditioning mode.
4. Pool Heating - indicates that the system is heating the pool water with recycled energy.
5. Space Heat - indicates that the space heating is operating.
6. Maintenance - indicates whether or not maintenance is required.
7. Manual - indicates that the system has been set to manual operation.

D. The following set points shall be accessible and adjustable from the display panel:
1. Space temperature
2. Space relative humidity
3. Pool water temperature

E. The following sensors shall be unit-mounted and monitored at the display panel:

1. Refrigerant high pressure
2. Refrigerant low pressure
3. Return air temperature
4. Supply air temperature
5. Return air relative humidity
6. Entering pool water temperature
7. Leaving pool water temperature
8. Evaporator leaving air temperature
9. Suction temperature
10. Discharge temperature

F. System Fault: Shall indicate via text message to the display what systems require attention or servicing. Built-in monitoring and diagnostics shall allow the user to view the following:
1. Power Failure
2. Dirty air filter
3. Refrigerant high and low pressure
4. System off
5. Anti-short cycle delay

2.16 Sequence of Operation

A. Unit shall be designed and sized to maintain the specified conditions. The unit operation shall be as follows:
1. Unit Start-up
2.
a. Power is turned on or system is restarted.
b. After a short initial delay to allow sensors to stabilize, the blower starts and operates continuously.
c. Based on unit mounted sensor feedback the unit shall begin/resume operation and will operate based on the sequence described below.
d.
3. Airside Configuration
4.
a. The unit delivers specified supply air continuously to the Natatorium.
b. The minimum exhaust air volume is set to meet the engineer's schedule.
c. The outdoor air varies, as needed, from the minimum scheduled CFM (usually code minimum) up to 100% of supply air CFM, based on the space requirements.
d.
5. Dehumidification Mode
6.
a. Return air relative humidity is above humidity setpoint.
b. Compressor starts using Compressor Start sequence.
c. If unit cannot maintain relative humidity within setpoint, compressor 2 will start.
d. The compressor waste heat is rejected into the glycol fluid loop which flows in parallel to the reheat coil and air conditioning air cooled heat exchanger.
e. The reheat coil has full (0-100%) modulating capabilities. The reheat output will modulate to maintain the space temperature at set point year round.
f.
7. Air Conditioning Mode

8.
   a. Return air temperature is above room temperature setpoint.
   b. Compressor starts if not already operating in dehumidification mode.
   c. Unneeded compressor hot gas is diverted to a refrigerant to glycol fluid cooled heat exchanger. Up to 100% of compressor heat is rejected into the glycol fluid which in turn is pumped outdoors to an outdoor air cooled heat exchanger for 100% heat rejection at summer design ambient conditions.
   d. 100% of compressor heat is rejected at the outdoor air cooled heat exchanger on a summer design day. On off peak days the reheat output will modulate to maintain the space temperature at set point year round.
   e. If unit cannot maintain return air temperature within setpoint, compressor 2 will start.
   f.
9. Space Heating Mode
10.
   a. Return air temperature is below room temperature setpoint.
   b. The Microprocessor space heating output signal (0-10 volt) is sent to the hot water control valve. The signal output will regulate based on the return air temperature.
   c.
11. Pool Water Heating Mode
12.
   a. Return pool water temperature is below pool water setpoint.
   b. If compressor is already operating from a Dehumidification or Air Conditioning demand, the solenoid valves divert the compressor hot gas through the coaxial heat exchanger/pool water heater and the rest of the compressor heat is rejected at either the reheat coil or the AC heat exchanger.
   c. If there is no pre-existing demand for the compressor to operate, the microprocessor sends a signal to the auxiliary pool water heater (remote by others) to operate. The compressor will not normally operate solely for a pool water heating demand unless configured to do so at the controller.
   d. Factory-installed relay(s) and factory furnished, field-installed pool water temperature sensor(s) are provided to enable the smart pool feature. This feature provides the ability to activate booster pool water pump(s) feeding the unit when pool water heating is in demand.
   e.
13. Exhaust Air Heat Recovery Mode
14.
   a. The minimum outdoor air damper and minimum exhaust fan are tied to the unit's occupancy scheduler and will operate on/off as programmed.
   b. Once the outdoor air temperature falls below the heat recovery setpoint (65 F adjustable) the glycol pump shall operate and circulate glycol between exhaust air and outdoor air heat recovery coils and recovering heat from the high energy/warm exhaust air and using it to preheat the incoming outside air.
   c.
15. Purge Mode
   a. This mode is manually triggered by an operator when super-chlorinating the pool. It can be triggered at the operator panel (unit mounted or optional remote), WebSentry or BACnet.
   b. It has an adjustable timed duration after which the system automatically resumes normal operation.

c. Once triggered by the operator:
d.
1) The compressors (if operating) pump down and cycle off.
2) Signal from the microprocessor sets the exhaust fan(s) to maximum CFM.
3) The unit mounted outdoor air dampers open fully. The return air dampers close.
4) The system is in 100% outdoor air ventilation mode.
5) After time period expires, all dampers and fans return to normal operating settings and the unit resumes normal operation.
6) Unit will control heating based on supply air temperature.
7)

16. Economizer Cooling Mode
17.
a. Return air temperature is above room temperature setpoint.
b. The microprocessor will compare the temperature of the outside air with the cooling setpoint.
c. When outside air as determined to be suitable by the microprocessor, it will be used as the first stage of cooling.
d. Unit will switch over to using compressor(s) if outside air cannot satisfy the space temperature conditions.
e.
18. Economizer Dehumidification Mode
19.
a. Return air relative humidity is above humidity setpoint.
b. The microprocessor will compare the moisture content of the outside air to the dehumidification setpoint.
c. When outside air as determined to be suitable by the microprocessor, it will be used as the first stage of dehumidification.
d. Unit will switch over to using compressor(s) if outside air cannot satisfy the space humidity conditions.
e.
20. Freeze Protection
21.
a. Supply air temperature falls below Freezestat setpoint or optional Freezestat sensor indicates a Freezestat condition.
b. All exhaust fans are stopped and all outdoor air dampers are fully closed.
c. Freezestat alarm is tripped. Alarm has to be manually cleared by operator.
d.
22. High Occupancy Event Mode – Provide control means to increase outdoor airflow rate and corresponding exhaust airflow rate on a temporary basis for use during high occupancy swimming events.

2.17 Factory Performance Testing

A. The unit shall be thoroughly tested under factory test conditions. A copy of the test report shall be available to the engineer upon request.

B. Microprocessor controls shall be factory adjusted and preset to the design conditions during testing.

C. The unit shall be accessible for real-time monitoring while in the QC test chamber upon request.

2.18 ACCESSORIES

A. Water-Cooling Heat Exchanger: Coaxial, vented, double-wall construction; with three-way refrigerant control valve.

B. Smoke Detectors: Photoelectric detector located in supply and return-air plenum, to de-energize unit.
   1. Operating Voltage: 24-V dc, nominal.
   2. Self-Restoring: Detectors do not require resetting or readjusting after actuation to restore them to normal operation.
   3. Plug-in Arrangement: Detector and associated electronic components mounted in module with tamper-resistant connection to fixed base with twist-locking plug. Terminals in fixed base accept building wiring.
   4. Integral Visual-Indicating Light: Digital-display type indicating detector operation.
   5. Sensitivity: Can be tested and adjusted in-place after installation.
   6. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the fire-alarm control panel.
   7. Sensor: Digital display or infrared light source with matching silicon-cell receiver.
   8. Detector Sensitivity: Between 2.5 and 3.5 percent/foot of smoke obscuration when tested according to UL 268A.
   9. Integral Thermal Detector: Fixed-temperature type with 135 deg F setting.

C. Electrical Convenience Outlet: 115-V ac fused, duplex, straight-blade receptacles, separately fused and located inside casing of dehumidification unit or in roof-curb perimeter.

2.19 SOURCE QUALITY CONTROL

A. Verification of Performance: Factory test and rate dehumidification units according to ARI 910.

B. Sound-Power-Level Ratings: Factory test and rate dehumidification units according to ARI 575.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before equipment installation.

C. Examine walls, floors, and roofs for suitable conditions where dehumidification units will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Equipment Mounting:
   1. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

3.3 CONNECTIONS

A. Where piping is installed adjacent to dehumidification units, allow space for service and maintenance of dehumidification units.

B. Connect piping to dehumidification units mounted on vibration isolators with flexible connectors.

C. Connect condensate drain pans using minimum NPS 1-1/4 copper tubing. Extend to nearest equipment or floor drain. Construct deep trap at connection to drain pan, and install cleanout at changes in direction.

D. Hot-Water Piping: Comply with requirements in Section 232113 "Hydronic Piping" and Section 232116 Hydronic Piping Specialties." Connect to supply coil tappings with shutoff valve, return coil tappings with balancing valve, and union or flange at each connection.

E. Duct installation requirements are specified in Section 233113 "Metal Ducts" and Section 233116 "Nonmetal Ducts." Drawings indicate the general arrangement of ducts. The following are specific connection requirements:
   1. Install ducts to termination in roof-mounted frames. Where indicated, terminate return-air duct through roof structure and insulate the space between roof and bottom of dehumidification unit.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:
   1. Leak Test: After installation, fill water coils with water, and test coils and connections for leaks. Repair leaks and retest until no leaks exist.
   2. Charge refrigerant coils with refrigerant and test for leaks. Repair leaks and retest until no leaks exist.

3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Dehumidification unit will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.
1. Complete installation and startup checks according to manufacturer's written instructions.

B. Internet based start-up assistance with factory technician online and on the telephone during the entire start up and commissioning.
1. Remote internet access and control must be initiated and confirmed by the factory prior to start-up for extended labour warranty to be in effect.

C. Perform the following final checks before startup:
1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Perform cleaning and adjusting specified in this Section.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify free fan wheel rotation and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.
5. Check lubrication of bearings, pulleys, belts, and other moving parts.
6. Set outside- and return-air mixing dampers to minimum outside-air setting.
7. Install clean filters.
8. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.

D. Starting procedures for dehumidification units include the following:
1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm. Replace malfunctioning motors, bearings, and fan wheels.
2. Measure and record motor's electrical values for voltage and amperage.
3. Manually operate dampers from fully closed to fully open position and record fan performance.

E. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing of dehumidification unit.

F. Startup Report: Report findings during startup. Identify startup steps, corrective measures taken, and final results.

3.6 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust initial temperature and humidity set points.

3.7 CLEANING

A. Clean dehumidification units internally, on completion of installation, according to manufacturer's written instructions. Clean fan interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheels, cabinets, and coils' entering-air face.

B. After completing system installation, testing, and startup service of dehumidification units, clean filter housings and install new filters.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain dehumidification units.

END OF SECTION 238416

PART 4 -

4.1

A.

B.

C.

D.

E.

F.

G.

H.

I.

J. [THIS PAGE INTENTIONALLY LEFT BLANK]

HVAC SYMBOLS - PIPING

- TOP TAKE-OFF
- BOTTOM TAKE-OFF
- PIPE RISE (ELBOW UP)
- PIPE DROP (ELBOW DOWN)
- FLOW DIRECTION
- REDUCER
- SUPPLY PIPE
- RETURN PIPE
- EXISTING PIPE (SUPPLY)
- EXISTING PIPE (RETURN)
- PIPE TO BE REMOVED (DEMO)
- D — CONDENSATE DRAIN
- RHG — REFRIGERANT HOT GAS
- RS — REFRIGERANT SUCTION
- RL — REFRIGERANT LIQUID
- HWS — HOT WATER SUPPLY
- HWR — HOT WATER RETURN
- THERMOMETER
- PRESSURE GAUGE
- PRESSURE GAUGE WITH SNUBBER & GAUGE COCK (HYDRONIC SYSTEMS)
- AIR VENT WITH SHUT-OFF COCK
- BALL VALVE
- BUTTERFLY VALVE
- GLOBE VALVE
- PLUG VALVE
- 3 WAY ATC VALVE
- 2 WAY ATC VALVE
- CHECK VALVE
- DRAIN VALVE WITH HOSE BIB
- BALANCING VALVE WITH MEMORY STOP
- STRAINER WITH BLOW-OFF VALVE AND THREADED HOSE END
- PIPE CAP
- MOMENT GUIDE
- EJ — EXPANSION JOINT
- FC — FLEXIBLE CONNECTION
- UNION
- PIPE SUPPORT CURB

HVAC GENERAL NOTES

1. THE HVAC DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO SHOW THE APPROXIMATE LOCATIONS OF EQUIPMENT, PIPING, DUCTWORK AND ASSOCIATED SYSTEMS. THE CONTRACTOR SHALL COORDINATE THE ACTUAL DIMENSIONS, LOCATION, AND INSTALLATION OF HVAC SYSTEMS WITH ACTUAL CONDITIONS IN THE FIELD.
   A. PIPE AND DUCT ELEVATIONS ARE FOR REFERENCE ONLY.
   B. DUCT SIZES ARE MINIMUM CLEAR INSIDE DIMENSIONS.
   C. COORDINATE INSTALLATION OF MECHANICAL WORK WITH ALL OTHER TRADES.
2. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING HIS BID AND SHALL EXAMINE ALL CONDITIONS AFFECTING THE INSTALLATION OF THE PROPOSED WORK AND SHALL INCLUDE IN HIS BID ALL LABOR AND MATERIALS REQUIRED TO COORDINATE THE INSTALLATION OF MECHANICAL SYSTEMS WITH EXISTING CONDITIONS.
3. THE CONTRACTOR SHALL COORDINATE THE SHUTDOWN AND REMOVAL OF EXISTING SYSTEMS AND EQUIPMENT AND THE INSTALLATION OF NEW SYSTEMS AND EQUIPMENT WITH THE PROJECT CONSTRUCTION PHASING SCHEDULE.
4. INSTALL, TEST, AND OPERATE HVAC SYSTEMS IN STRICT ACCORDANCE WITH ALL APPLICABLE LAWS, CODES, REGULATIONS, AND ORDINANCES OF THE MUNICIPAL, COUNTY, STATE, FEDERAL, PUBLIC UTILITIES, AND ALL OTHER AUTHORITIES HAVING JURISDICTION. THE CONTRACTOR SHALL INCLUDE IN HIS BID ALL PERMIT FEES ALL LOCAL, STATE, AND FEDERAL TAXES, AND UTILITY SERVICE CHARGES.
5. DO NOT RIG OR HOIST EQUIPMENT OR MATERIALS ABOVE OCCUPIED AREAS OF THE BUILDING.
6. PROVIDE A ONE(1) YEAR WARRANTY, FROM THE DATE OF FINAL COMPLETION AND ACCEPTANCE BY THE OWNER, FOR ALL EQUIPMENT, MATERIALS, WORKMANSHIP, AND LABOR. AIR-CONDITIONING EQUIPMENT COMPRESSORS SHALL BE WARRANTED FOR FIVE (5) YEARS FROM THE DATE OF FINAL COMPLETION AND ACCEPTANCE BY THE OWNER.
7. SUBMIT SHOP DRAWINGS OF ALL EQUIPMENT AND MATERIALS TO BE FURNISHED AND INSTALLED BY THIS CONTRACTOR. ALL EQUIPMENT AND MATERIALS SHALL BE NEW.
   A. SUBMIT SHEET METAL SHOP DRAWINGS DIMENSIONED AND DRAWN TO SCALE, 3/8"=1'-0", DEPICTING DUCT LOCATIONS, SIZES, ELEVATIONS, FIRE DAMPERS, AND DUCT ACCESSORIES, AND OTHER PERTINENT ELEMENTS INCLUDING CEILING GRID, STRUCTURAL STEEL, LIGHT FIXTURES, SPRINKLERS, AND PIPING MAINS.
8. UNLESS OTHERWISE INDICATED, THIS CONTRACTOR SHALL PERFORM ALL CUTTING AND PATCHING OF THE EXISTING FACILITY FOR HIS RESPECTIVE WORK. PATCHING SHALL MATCH EXISTING MATERIALS, FINISHES, AND METHODS OF CONSTRUCTION.
   A. PROVIDE LINTELS WHERE PENETRATING EXISTING MASONRY CONSTRUCTION; SUBMIT SHOP DRAWINGS ON LINTELS, INDICATING SIZE AND TYPE, FOR PENETRATIONS OF LOAD BEARING MASONRY WALLS.
   B. CUTTING AND PATCHING OF THE ROOF SHALL BE PERFORMED BY AN AUTHORIZED SUB-CONTRACTOR CERTIFIED BY THE ORIGINAL ROOFING MANUFACTURER; ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH EXISTING WARRANTY REQUIREMENTS.
   C. PROVIDE STEEL FRAMING ANGLES WHERE PENETRATING FLOOR AND ROOF DECKS; ANGLES SHALL BE MINIMUM 4"x4"x1/4" UNLESS NOTED OTHERWISE.
   D. MODIFY EXISTING ROOF, FLOOR, AND WALL OPENINGS TO ACCOMMODATE THE INSTALLATION OF NEW EQUIPMENT AND SYSTEMS; PROVIDE ANGLE FRAMING FOR ROOF AND FLOOR PENETRATIONS, SLEEVES AND LINTELS FOR WALL PENETRATIONS. PATCH EXISTING ROOF, FLOOR, AND WALL OPENINGS TO MATCH EXISTING MATERIALS AND METHODS WHERE PENETRATIONS ARE NOT UTILIZED FOR NEW EQUIPMENT AND SYSTEMS.
9. PROVIDE UL LISTED FIRE PROOFING SEALANTS AROUND ALL DUCT, PIPING, AND CONDUIT PENETRATIONS OF RATED FIRE RESISTANT WALLS AND FLOORS. PROVIDE UL LISTED DRAFT STOPPING SEALANTS AROUND ALL DUCT, PIPING, AND CONDUIT PENETRATIONS OF NON-RATED FLOORS.
10. ROUND AND RECTANGULAR DUCTWORK SHALL BE OF METAL CONSTRUCTION.
11. PRIME AND PAINT ALL FERROUS MATERIALS EXPOSED TO THE OUTDOORS. PRIME AND PAINT ADDITIONAL MATERIALS AS NOTED ON THE DRAWINGS. PRIMER AND PAINT SHALL BE SUITABLE FOR ITS INTENDED APPLICATION.
12. PERFORM START-UP EQUIPMENT IN STRICT ACCORDANCE WITH THE MANUFACTURERS' WRITTEN START-UP INSTRUCTIONS OR IN CONJUNCTION WITH FACTORY AUTHORIZED TECHNICIANS. ADJUST AUTOMATIC TEMPERATURE CONTROLS TO ACHIEVE SATISFACTORY TEMPERATURE AND/OR HUMIDITY CONTROL AS APPLICABLE.
13. FURNISH TO THE OWNER, A BOUND VOLUME OF OPERATING AND MAINTENANCE INSTRUCTIONS INCLUDING MANUFACTURERS CATALOG NUMBERS, DESCRIPTIONS, AND PARTS LISTS FOR ALL EQUIPMENT PROVIDED UNDER THIS CONTRACT.
14. PROVIDE ALL METHODS AND MATERIALS FOR SUPPORTING EQUIPMENT, PIPING, AND DUCTWORK. IN AREAS OF BAR JOIST CONSTRUCTION, SUPPORT LOADS FROM TOP CHORD OF BAR JOISTS AT PANEL POINTS.
15. PROVIDE AUTOMATIC AIR VENTS AT ALL HIGH POINTS IN HYDRONIC PIPING SYSTEMS; PROVIDE DRAIN VALVES AT ALL LOW POINTS.
16. PROVIDE ACCESS DOORS IN WALLS AND CEILINGS FOR ALL SERVICEABLE DEVICES INCLUDING FIRE DAMPERS, SHUT-OFF VALVES, CONTROL VALVES, CONTROL DAMPERS, AND VOLUME DAMPERS. PROVIDE UL-LISTED ACCESS DOORS IN FIRE RESISTANCE RATED CONSTRUCTION.
17. PROVIDE IDENTIFICATION OF MECHANICAL SYSTEMS AND EQUIPMENT INCLUDING DUCTWORK AND PIPING.
   A. PROVIDE LOCATION / IDENTIFICATION MARKERS ON CEILING GRID OR ACCESS PANELS FOR SHUT-OFF VALVES, CONTROL VALVES, FIRE DAMPERS, SMOKE DETECTORS, AND OTHER SERVICEABLE DEVICES.

HVAC SYMBOLS - DUCTWORK

- BREAK IN ROUND DUCT
- BREAK IN RECTANGULAR DUCT
- SUPPLY AIR RISE
- SUPPLY AIR FLOOR OR ROOF PENETRATION
- SUPPLY AIR DROP
- RETURN, EXHAUST, OR OUTSIDE AIR RISE
- RETURN, EXHAUST, OR OUTSIDE AIR FLOOR OR ROOF PENETRATION
- RETURN, EXHAUST, OR OUTSIDE AIR DROP
- TRANSITION IN RISE
- VD — BRANCH DUCT WITH TOP TAKE-OFF AND VOLUME DAMPER
- 12x12 — RECTANGULAR DUCT SIZE (FIRST FIGURE = WIDTH)
- 12"Ø — ROUND DUCT SIZE
- ACOUSTICAL LINING
- EXISTING DUCT
- EXISTING DUCT TO BE REMOVED (DEMO)
- SUPPLY DIFFUSER
- RETURN OR EXHAUST DIFFUSER
- AD — ACCESS DOOR
- FC — FLEXIBLE CONNECTION
- SD — DUCT SMOKE DETECTOR
- FS — SMOKE/ FIRE DAMPER
- VD — VOLUME DAMPER
- ATC — ATC CONTROL DAMPER
- BDD — BACKDRAFT DAMPER
- FD, AD — FIRE DAMPER WITH ACCESS DOOR
- 90° RADIUS ELBOW
- 45° RADIUS ELBOW
- 90° ELBOW WITH TURNING VANES
- BRANCH DUCT TAKE-OFF WITH VOLUME DAMPER
- FLEXIBLE DUCT
- SLOT DIFFUSER
- SIDE WALL DIFFUSER

HVAC EQUIPMENT

- DHU - — DEHUMIDIFICATION UNIT (INCLUDES NATATORIUM UNITS)
- ACC - — AIR-COOLED CONDENSER
- EF - — EXHAUST FAN
- # CFM — GRILLE, REGISTER, OR DIFFUSER

HVAC SYMBOLS - CONTROLS

- T — THERMOSTAT OR TEMPERATURE SENSOR
- H — HUMIDISTAT OR HUMIDITY SENSOR

HVAC ABBREVIATIONS

AC	AIR CONDITIONING
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AFR	ABOVE FINISHED ROOF
AMB	AMBIENT
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
ATC	AUTOMATIC TEMPERATURE CONTROL
AWT	AVERAGE WATER TEMPERATURE
BHP	BREAK HORSE POWER
BHP	BOILER HORSE POWER
BMS	BUILDING MANAGEMENT SYSTEM
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BOS	BOTTOM OF STRUCTURE
BWE	BAKED WHITE ENAMEL
FA	FREE AREA
FM	CUBIC FEET PER MINUTE
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
FV	FACE VELOCITY
COP	COEFFICIENT OF PERFORMANCE
CW	COLD WATER
DB	DRY BULB
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EC	ELECTRICAL CONTRACTOR
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
EFF	EFFICIENCY
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
EX	EXISTING
EXT	EXTERIOR
FLA	FULL LOAD AMPS
FL DR	FLOOR DRAIN
FT	FEET
FT HD	FEET OF HEAD
GA	GAUGE
HC	HVAC CONTRACTOR
HP	HORSE POWER
HTG	HEATING
HW	HOT WATER
HWR	HOT WATER RETURN
ID	INSIDE DIAMETER OR IDENTIFIER
IN	INCHES
INSUL	INSULATION
IN-WC	INCHES OF WATER COLUMN
IR	INFRARED
ISP	INTERNAL STATIC PRESSURE
IW	INDIRECT WASTE
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
LAT CAP	LATENT CAPACITY
LBS	POUNDS
LRA	LOCKED ROTOR AMPS
LWT	LEAVING WATER TEMPERATURE
MBH	1,000 BTU
MC	MECHANICAL CONTRACTOR
MCA	MINIMUM CIRCUIT AMPACITY
M.O.D.	MOTOR OPERATED DAMPER
MOP	MAXIMUM OVERCURRENT PROTECTION
MFR	MANUFACTURER
MHP	MAXIMUM HORSE POWER
RNC	ROOM NOISE CRITERIA
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OA	OUTSIDE AIR
OC	ON CENTER
OD	OUTSIDE DIAMETER
OED	OPEN ENDED DUCT
PC	PLUMBING CONTRACTOR
PD	PRESSURE DROP
PIR	PASSIVE INFRARED
PRV	PRESSURE RELIEF VALVE
PSIG	POUNDS PER SQUARE INCH GAUGE
RA	RETURN AIR
RH	RELATIVE HUMIDITY
RLA	RUN LOAD AMPS
RPM	REVOLUTIONS PER MINUTE
SA	SUPPLY AIR
SS	STAINLESS STEEL
SST	SATURATED SUCTION TEMPERATURE
SEER	SEASONAL ENERGY EFFICIENCY RATIO
SEN CAP	SENSIBLE CAPACITY
SP	STATIC PRESSURE
T	THERMOMETER
TA	TRANSFER AIR
TEMP	TEMPERATURE
TOG	TOP OF GRILLE
TOL	TOP OF LOUVER
TOT. CAP	TOTAL CAPACITY
TSP	TOTAL STATIC PRESSURE
TSTAT	THERMOSTAT
TW	TEPID WATER
UC	UNDERCUT DOOR
UNO	UNLESS NOTED OTHERWISE
V	VENT
V/P/H	VOLTS/PHASE/HERTZ
VTR	VENT THRU ROOF
W	WALL-MOUNTED
WB	WET BULB
WPD	WATER PRESSURE DROP
WT	WEIGHT

APPLICABLE CODES & STANDARDS

PENNSYLVANIA UNIFORM CONSTRUCTION CODE INCLUDING BUT NOT LIMITED TO:

2018 - INTERNATIONAL MECHANICAL CODE

2018 - INTERNATIONAL ENERGY CONSERVATION CODE

ANSI / ASHRAE / IESNA STD 90.1

ANSI / ASHRAE STD 62.1

COMMON ABBREVIATIONS

A/E	ARCHITECT/ENGINEER
AB CLG	ABOVE CEILING
ABV	ABOVE
AFF	ABOVE FINISHED FLOOR
AFI	ARC-FAULT INTERRUPTER
AFR	ABOVE FINISHED ROOF
ALT	ALTERNATE
ATS	AUTOMATIC TRANSFER SWITCH
BFC	BELOW FINISHED CEILING
C/G	COUNTERTOP GFI
CD	CORD DROP
CL	CENTERLINE
CLG	CEILING
CM	CEILING MOUNTED
COL	COLUMN
CT	COUNTERTOP HEIGHT-44" AFF UNO OR CURRENT TRANSFORMER
CR	CORD REEL
DBF	DOWN BELOW FLOOR
DET	DETAIL
DIA	DIAMETER
DIM	DIMENSION
DN	DOWN
DW	DISHWASHER
DWG	DRAWING
EC	ELECTRICAL CONTRACTOR
EL	ELEVATION
ELEV	ELEVATOR
EMER	EMERGENCY
EO	EMERGENCY ONLY (NORMALLY OFF)
EWC	ELECTRIC WATER COOLER (PROVIDE GFI RECEPTACLE)
EX	EXISTING
FA	FIRE ALARM
FBO	FURNISHED BY OWNER
FLR	FLOOR
FPC	FIRE PROTECTION CONTRACTOR
FSC	FOOD SERVICE CONTRACTOR
GC	GENERAL CONTRACTOR
GFI	GROUND-FAULT INTERRUPTER
GND	GROUND
HC	HVAC CONTRACTOR
HCP	HANDICAPPED
HGT	HEIGHT
HR	HOUR
IR	INFRARED
JB	JUNCTION BOX
KES	KITCHEN EQUIPMENT SUPPLIER
LV	LOW-VOLTAGE
MC	MECHANICAL CONTRACTOR
MCA	MINIMUM CIRCUIT AMPACITY
MOCP	MAXIMUM OVERCURRENT PROTECTION
MT	MULTITECHNOLOGY
MO	MICROWAVE OVEN
NA	NOT APPLICABLE
NE	NORMAL/EMERGENCY (NORMALLY ON)
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OFCI	OWNER FURNISHED-CONTRACTOR INSTALLED
PC	PLUMBING CONTRACTOR
PIR	PASSIVE INFRARED
SE	SERVICE ENTRANCE
SECT	SECTION
SHT	SHEET
SIM	SIMILAR
SPD	SURGE PROTECTION DEVICE
SPEC	SPECIFICATION
SS	SERVICE SINK
STD	STANDARD
SUSP	SUSPENDED
TBR	TO BE REMOVED
TL	TASK LIGHT
TR	TAMPER RESISTANT
TSTAT	THERMOSTAT
UNO	UNLESS NOTED OTHERWISE
US	ULTRASONIC
W/	WITH
W/O	WITHOUT
W	WALL-MOUNTED
WP	WEATHERPROOF

COMMON SYMBOLS

- N — PLAN NORTH
- A / H1.1 — SECTION ID; SHEET NO. WHERE SECTION IS; DIRECTIONAL VIEW OF SECTION
- REVISION CLOUD
- REVISION NUMBER
- ELEVATION 100.00'
- DIRECTION OF VIEW; SHEET NO. WHERE EL. IS DRAWN; ELEVATION ID
- KEYNOTE
- 1 / H1.1 — DETAIL ID; SHEET NO. WHERE DETAIL IS
- 101 — ROOM/SPACE NO.
- TYPE ID — EQUIPMENT TAG SHOWING TYPE AND ID. SEE EQUIPMENT SCHEDULES FOR DETAILS
- PROVIDE NEW
- EXISTING TO REMAIN
- REMOVE EXISTING
- CONNECT TO EXISTING
- EXISTING TO BE REMOVED

DRAWING LIST

POOL DEHUMIDIFICATION

FOR

COUNCIL ROCK SCHOOL DISTRICT NORTH HIGH SCHOOL

62 SWAMP ROAD

NEWTOWN, PENNSYLVANIA

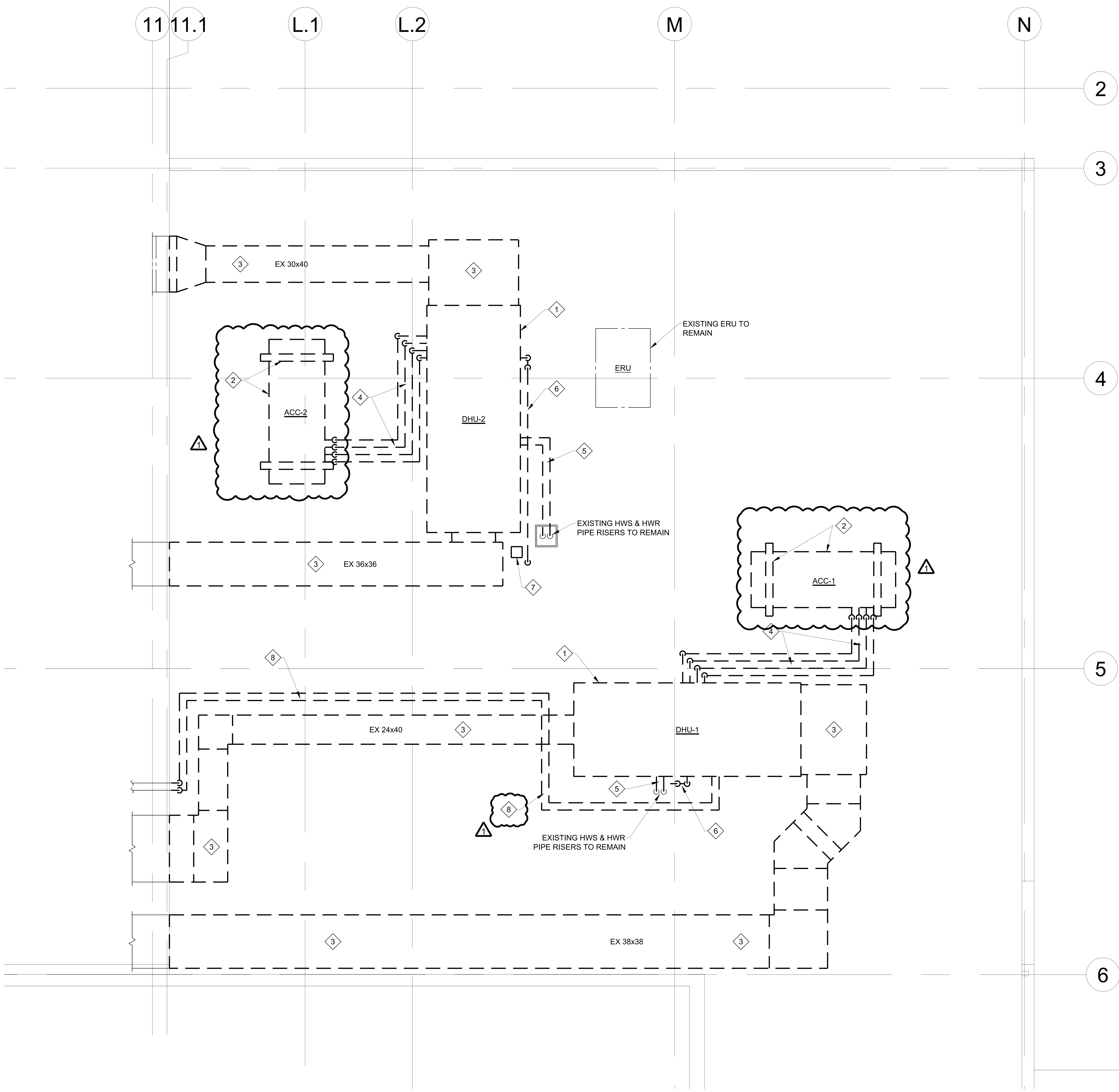
No.	Submittal / Revision	Apv	By	Date
△	ADDENDUM 2	...	...	02/13/25

COVER SHEET

Designed By:	Drawn By:	Checked By:
JZ	TPM	DCD
Issue Date:	Project No.:	Scale:
02/03/25	099729	AS SHOWN

Drawing No.:

H0.1



ROOF PLAN - DEMOLITION

Scale: 1/4" = 1'-0"

GENERAL NOTES DEMOLITION

1. OWNER RESERVES RIGHT TO CLAIM ANY AND ALL SALVAGEABLE MATERIALS AND EQUIPMENT. PRIOR TO COMMENCING DEMOLITION WORK, IDENTIFY ITEMS OWNER CHOOSES TO CLAIM. REMOVE AND STORE CLAIMED ITEMS. REMOVE AND DISPOSE OF ALL UNCLAIMED MATERIALS AND EQUIPMENT.
2. DO NOT RIG OR HOIST REMOVED EQUIPMENT OR MATERIALS OVER OCCUPIED AREAS OF THE BUILDING.
3. THE MECHANICAL CONTRACTOR SHALL NOT PERFORM HAZARDOUS MATERIAL ABATEMENT. IMMEDIATELY NOTIFY THE OWNER AND CONSTRUCTION MANAGER IN THE EVENT HAZARDOUS MATERIALS ARE ENCOUNTERED PRIOR TO OR DURING DEMOLITION. HAZARDOUS MATERIAL ABATEMENT INCLUDING THE REMOVAL OF ASBESTOS, LEAD, PCB'S, AND MOLD SHALL BE PERFORMED BY THE OWNER OR HIS SEPARATE CONTRACTOR.
4. UNLESS OTHERWISE NOTED, THE REMOVAL AND DISPOSAL OF REFRIGERANTS, THAT ARE CONTAINED WITHIN MECHANICAL EQUIPMENT AND PIPING SYSTEMS SHALL BE PERFORMED BY THE MECHANICAL CONTRACTOR AND HIS CERTIFIED PERSONNEL OR CERTIFIED SUB-CONTRACTOR.
5. COORDINATE THE REMOVAL OF HVAC SYSTEMS IN ACCORDANCE WITH THE PROJECT CONSTRUCTION PHASING SCHEDULE. DO NOT REMOVE OR DE-ACTIVATE SYSTEMS NEEDED TO REMAIN IN OPERATION THROUGHOUT THE DESIGNATED CONSTRUCTION PHASES. WHERE PARTIAL REMOVAL OF OR CONNECTION TO EXISTING SYSTEMS IS REQUIRED, COORDINATE PERIODS OF TEMPORARY SHUTDOWN WITH THE OWNER OR CONSTRUCTION MANAGER.
6. UNLESS OTHERWISE NOTED, ALL CUTTING AND PATCHING OF EXISTING FLOORS, CEILINGS, WALLS, AND ROOFS AS NEEDED TO PERFORM MECHANICAL DEMOLITION WORK, INCLUDING TEMPORARY REMOVAL AND RE-INSTALLATION OF CEILINGS, SHALL BE PERFORMED BY THE MECHANICAL CONTRACTOR. PATCH WORK SHALL BE COMPATIBLE WITH EXISTING CONSTRUCTION MATERIALS, FINISHES, AND FIRE RESISTANCE RATINGS. PATCHING OF ROOFS SHALL INCLUDE THE CLOSURE OF EXISTING ROOF OPENINGS WITH CORRUGATED METAL DECK, STANDING SEAM SHEET METAL, STEEL PLATES, CONCRETE, WOOD, INSULATION, AND OTHER MATERIALS TO MATCH THE EXISTING ROOF CONSTRUCTION. PATCHING OF EXISTING ROOFING WEATHERPROOFING SURFACES SHALL BE PERFORMED BY AN APPROVED ROOFING SUB-CONTRACTOR AND IN ACCORDANCE WITH THE ORIGINAL ROOFING MANUFACTURER'S WARRANTY REQUIREMENTS.
7. PROVIDE TEMPORARY DUST PROTECTION OF EXISTING FIRE DETECTION DEVICES IN AREAS WHERE DEMOLITION WORK WILL BE PERFORMED. COORDINATE TEMPORARY PROTECTION AND SHUTDOWN OF FIRE ALARM SYSTEMS WITH THE OWNER.
8. IN LOCATIONS WHERE THE MECHANICAL CONTRACTOR IS PERFORMING DEMOLITION WORK, INCLUDING CUTTING OF EXISTING FLOORS, WALLS, CEILINGS, AND ROOF FOR WORK RELATED TO THE INSTALLATION OF NEW HVAC WORK, PROVIDE TEMPORARY DUST CONTROL BARRIERS AND EXHAUST FANS TO MAINTAIN A NEGATIVE SPACE PRESSURE IN THE AREA OF WORK.

KEYNOTES - DEMOLITION

1. REPLACE EXISTING DEHUMIDIFICATION UNIT. RECLAIM REFRIGERANT PRIOR TO REMOVING UNIT. DISCONNECT EXISTING ATC AND BMS WIRING AND CONTROLS. REMOVE EXISTING UNIT AND ALL ASSOCIATED REFRIGERANT PIPING. EXISTING SUPPORT STRUCTURE TO REMAIN. EC TO DISCONNECT AND RECONNECT POWER WIRING.
2. REPLACE EXISTING AIR-COOLED CONDENSER. RECLAIM REFRIGERANT PRIOR TO REMOVING UNIT. DISCONNECT EXISTING ATC AND BMS WIRING AND CONTROLS. REMOVE EXISTING UNIT AND ALL ASSOCIATED REFRIGERANT PIPING. REPLACE EXISTING SUPPORT CURBS. EC TO DISCONNECT AND RECONNECT POWER WIRING.
3. REMOVE EXISTING DUCTWORK BACK TO EXISTING WALL PENETRATION. REMOVE EXISTING DUCT SUPPORTS. EXISTING SUPPORT ROOF CURBS TO REMAIN.
4. REMOVE EXISTING REFRIGERANT PIPING AND SUPPORTS.
5. REMOVE EXISTING HWS & HWR PIPING AND ELECTRIC HEAT TRACE CABLES, BACK TO ROOF PENETRATION. RETAIN PIPE RISERS THRU ROOF FOR RECONNECTION. REPLACE VALVES BELOW ROOF, PROVIDE NEW ATC VALVE.
6. REMOVE EXISTING AC CONDENSATE DRAIN PIPING AND ELECTRIC HEAT TRACE CABLES.
7. REPLACE EXISTING ELECTRIC HEAT TRACE CONTROLLER.
8. REPLACE EXISTING POOL WATER PIPING AND ELECTRIC HEAT TRACE CABLES. CAP AT EXISTING WALL.

POOL DEHUMIDIFICATION
FOR
COUNCIL ROCK SCHOOL DISTRICT NORTH HIGH SCHOOL
62 SWAMP ROAD
NEWTOWN, PENNSYLVANIA

No.	Submittal / Revision	Apv	By	Date
1	ADDENDUM 2	...	...	02/13/25

ROOF PLAN DEMOLITION

Designed By:	Drawn By:	Checked By:
JZ	TPM	DCD
Issue Date:	Project No.:	Scale:
02/03/25	099729	AS SHOWN

Drawing No.: H1.2

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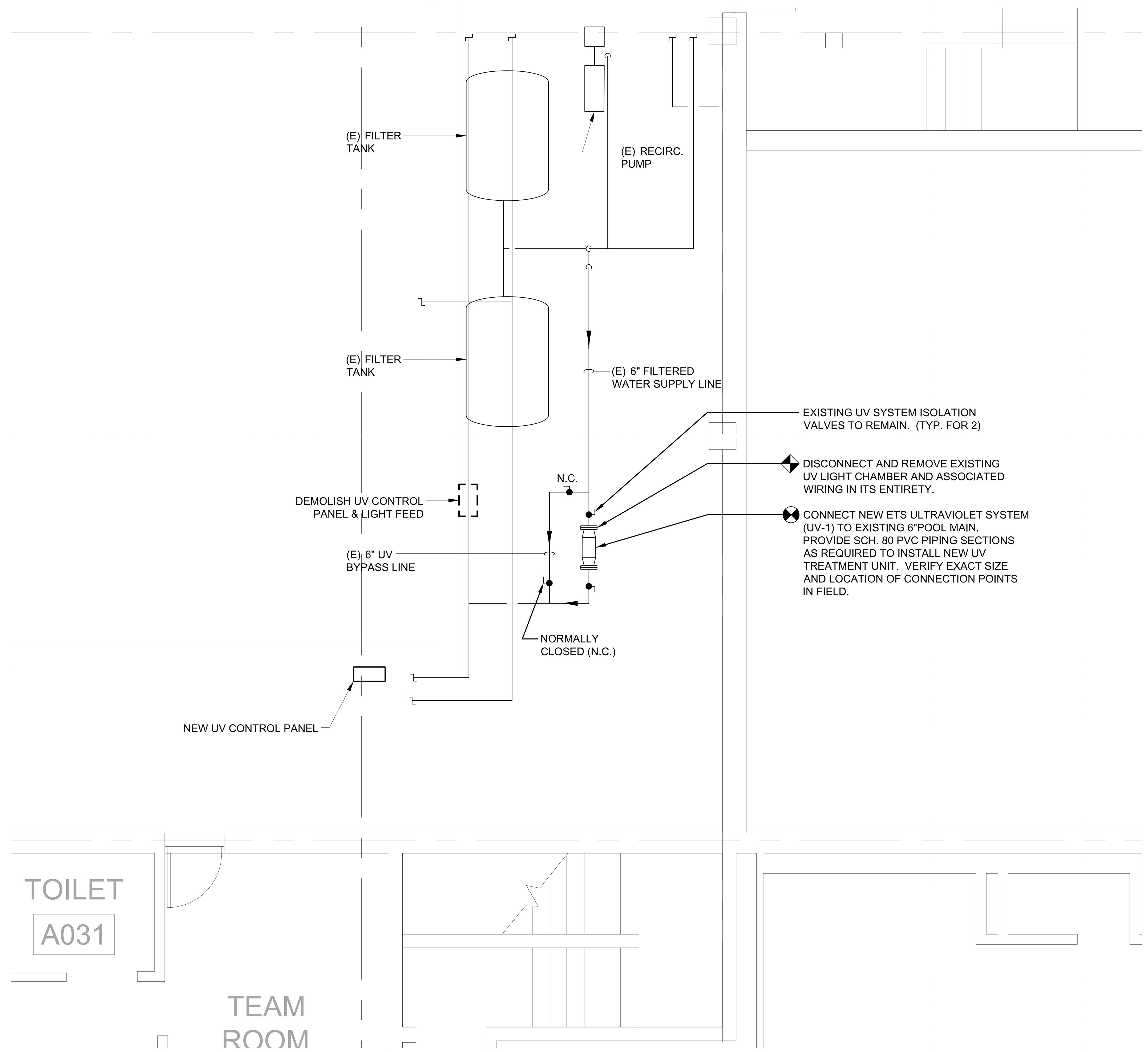

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POOL FILTER ROOM

0 1' 2' 4' 8'

Scale: 1/4" = 1'-0"

POOL EQUIPMENT SPECIFICATIONS

UV DISINFECTIONS SYSTEM (UV-1)

ETS ULTRAVIOLET SYSTSEM Mo. UV-WF-215-6-NEMA12
LAMPS = QTY 2 @ 1.5 KW EA. (3.0 KW TOTAL OUTPUT)
RATED FOR 810 GPM WITH 6" ANSI FLANGED CONNECTIONS.
INCLUDES CONTROL PANEL (208/240 SINGLE PHASE) / NEMA 12 CABINET ENCLOSURE AND EZ MANUAL STRAINER.
PROVIDE STANDARD CABLE LENGTH OF 30 FEET.

PROVIDE INSTALLATION, START-UP & OPERATOR TRAINING.

MATERIAL SPECIFICATIONS:
SCH. 80 PVC PIPE, FITTINGS, FLANGES, DOMINION BUTTERFLY VALVES (QTY. 2), NUTS, BOLTS, WASHERS AND UNI-STRUT TO SUPPORT THE UV CHAMBER AND THE UV UNIT.

CONTACT: IF IT'S WATER, INC.
MATT O'NEILL
MATT@IFISWATER.NET
610-269-2062

Run the "Logo Address" Command
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or type "Cha_LogoAddress"

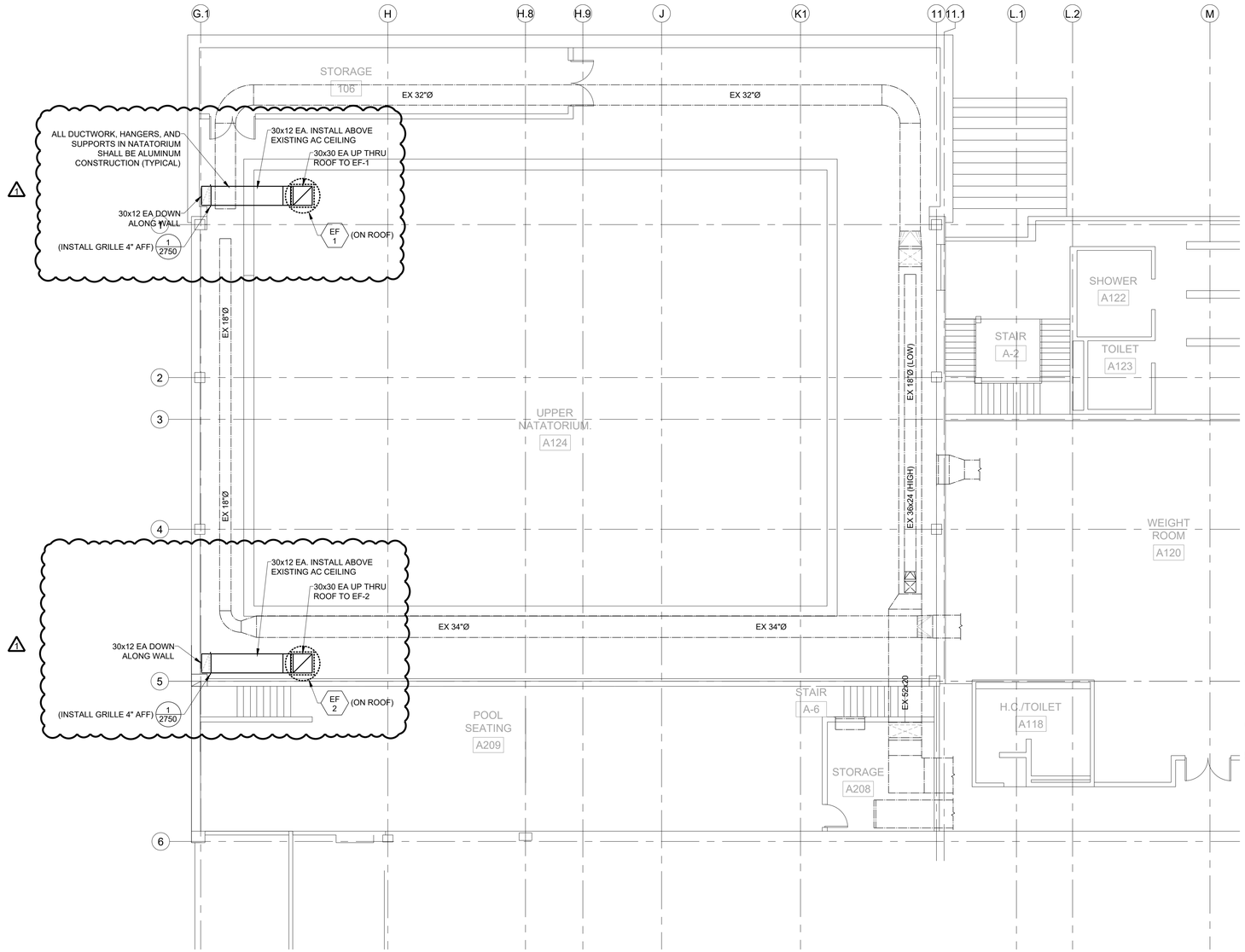
POOL DEHUMIDIFICATION
FOR
COUNCIL ROCK
SCHOOL DISTRICT
NORTH HIGH SCHOOL
62 SWAMP ROAD
NEWTOWN, PENNSYLVANIA

No.	Submittal / Revision	Apv	By	Date
2	ADDENDUM 2	...	...	02/13/25

POOL
FILTER
ROOM

Designed By:	Drawn By:	Checked By:
NRZ	NRZ	NRZ
Issue Date:	Project No.:	Scale:
02/03/25	099729	AS SHOWN

Drawing No.:
H2.0



GENERAL NOTES

1. HC TO CUT AND PATCH EXISTING ROOF TO INSTALL EXHAUST DUCTWORK.

N

FLOOR PLAN

0 2' 4' 8' 16'

Scale: 1/8" = 1'-0"

Run the "Logo Address" Command
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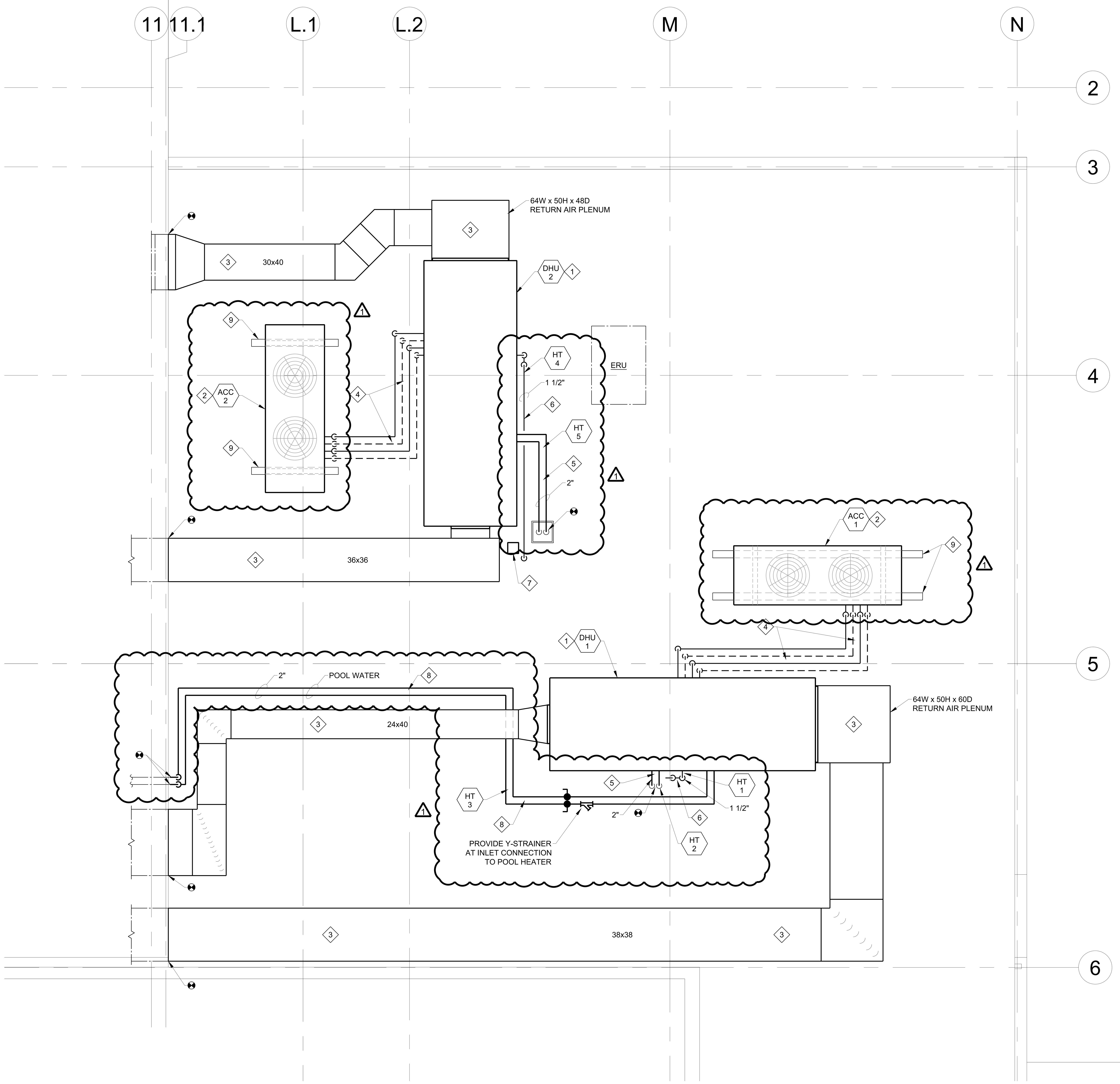
POOL DEHUMIDIFICATION
FOR
COUNCIL ROCK SCHOOL DISTRICT
NORTH HIGH SCHOOL
62 SWAMP ROAD
NEWTOWN, PENNSYLVANIA

No.	Submittal / Revision	Apv	By	Date
1	ADDENDUM 2	...	...	02/13/25

FLOOR PLAN

Designed By:	Drawn By:	Checked By:
JZ	TPM	DCD
Issue Date:	Project No.:	Scale:
02/03/25	099729	AS SHOWN

Drawing No.:
H2.1



N

ROOF PLAN

0 1' 2' 4' 8'

Scale: 1/4" = 1'-0"

GENERAL NOTES

1. ALL DUCTWORK SHALL BE OF ALUMINUM CONSTRUCTION WITH EXTERNAL INSULATION AND ALUMINUM JACKETING.
2. ALL HWS, HWR, & AC DRAIN PIPING SHALL BE HEAT TRACED (ELECTRIC CABLE), INSULATED AND COVERED WITH ALUMINUM JACKETING.
3. RE-SUPPORT DUCTWORK AND PIPING FROM EXISTING ROOF CURBS AND DUNNAGE FRAMES.

KEYNOTES

1. PROVIDE NEW DEHUMIDIFICATION UNIT. RECONNECT TO EXISTING ATC AND BMS WIRING AND CONTROLS. INSTALL ON EXISTING SUPPORT STRUCTURE. EC TO RECONNECT POWER WIRING.
2. PROVIDE NEW AIR-COOLED CONDENSER. RECONNECT TO EXISTING ATC AND BMS WIRING AND CONTROLS. INSTALL ON EXISTING SUPPORT CURBS. EC TO RECONNECT POWER WIRING.
3. PROVIDE NEW DUCTWORK BACK TO EXISTING WALL PENETRATION. REUSE EXISTING SUPPORT ROOF CURBS.
4. PROVIDE NEW REFRIGERANT PIPING AND SUPPORTS.
5. PROVIDE NEW HWS & HWR PIPING AND ELECTRIC HEAT TRACE CABLES, FROM UNIT TO ROOF PENETRATION. RECONNECT TO EXISTING PIPE RISERS THRU ROOF. PROVIDE NEW VALVES BELOW ROOF.
6. PROVIDE NEW AC CONDENSATE DRAIN PIPING AND ELECTRIC HEAT TRACE CABLES.
7. PROVIDE NEW ELECTRIC HEAT TRACE CONTROLLER.
8. PROVIDE NEW POOL WATER PIPING AND HEAT TRACE CABLES FROM DHU-1 BACK TO EXISTING WALL PENETRATION.
9. PROVIDE NEW 14" HIGH EQUIPMENT ROOF CURBS TO SPAN EXISTING BAR JOIST SPACING. FIELD VERIFY FINAL POSITION. CUT AND PATCH EXISTING ROOF TO INSTALL CURBS.

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Run the "Logo Address" Command
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POOL DEHUMIDIFICATION
FOR
COUNCIL ROCK
SCHOOL DISTRICT
NORTH HIGH SCHOOL
62 SWAMP ROAD
NEWTOWN, PENNSYLVANIA

No.	Submittal / Revision	Apv	By	Date
1	ADDENDUM 2	---	---	02/13/25

ROOF PLAN

Designed By:	Drawn By:	Checked By:
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Issue Date:	Project No.:	Scale:
02/03/25	099729	AS SHOWN

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H2.2

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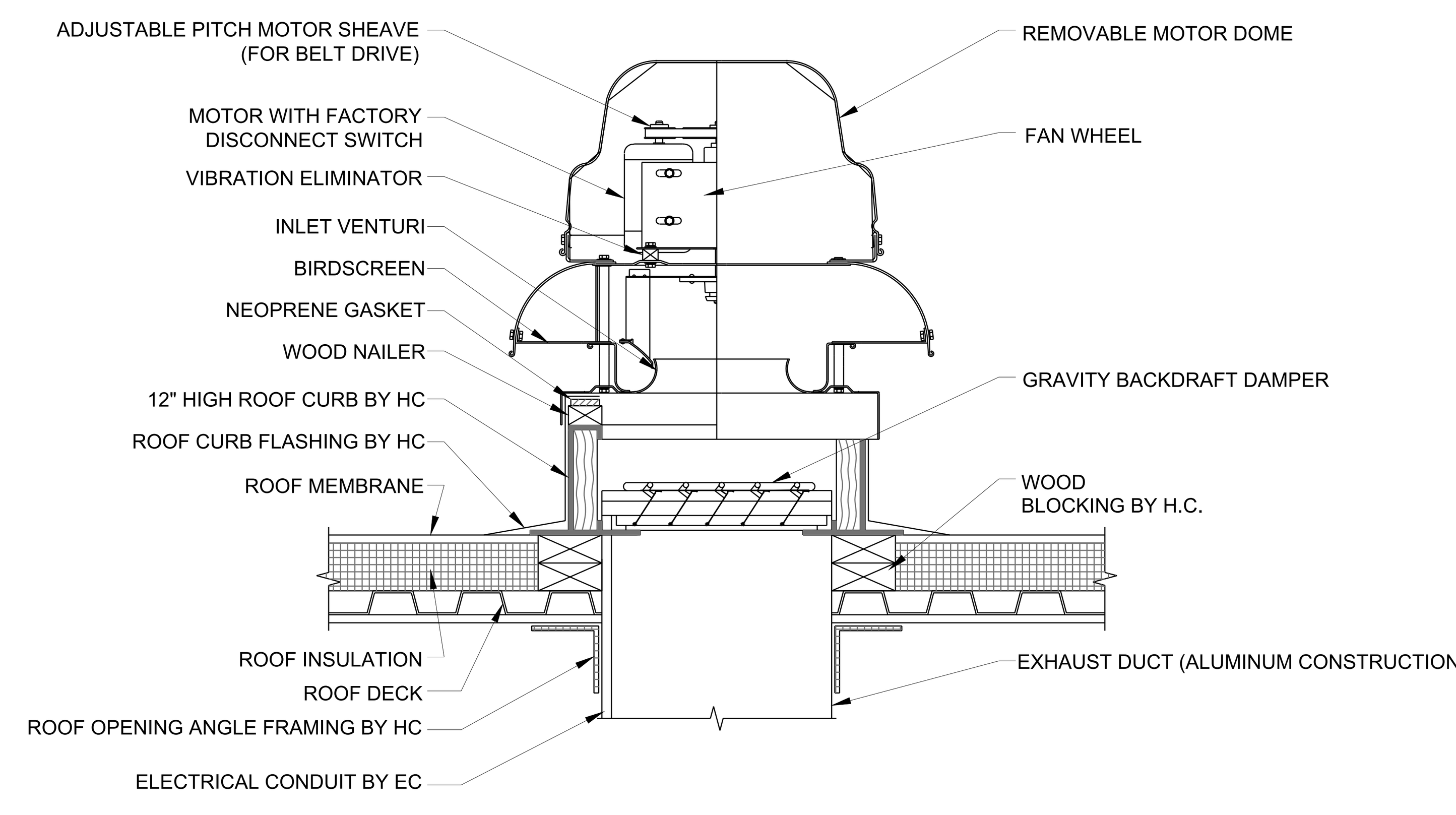
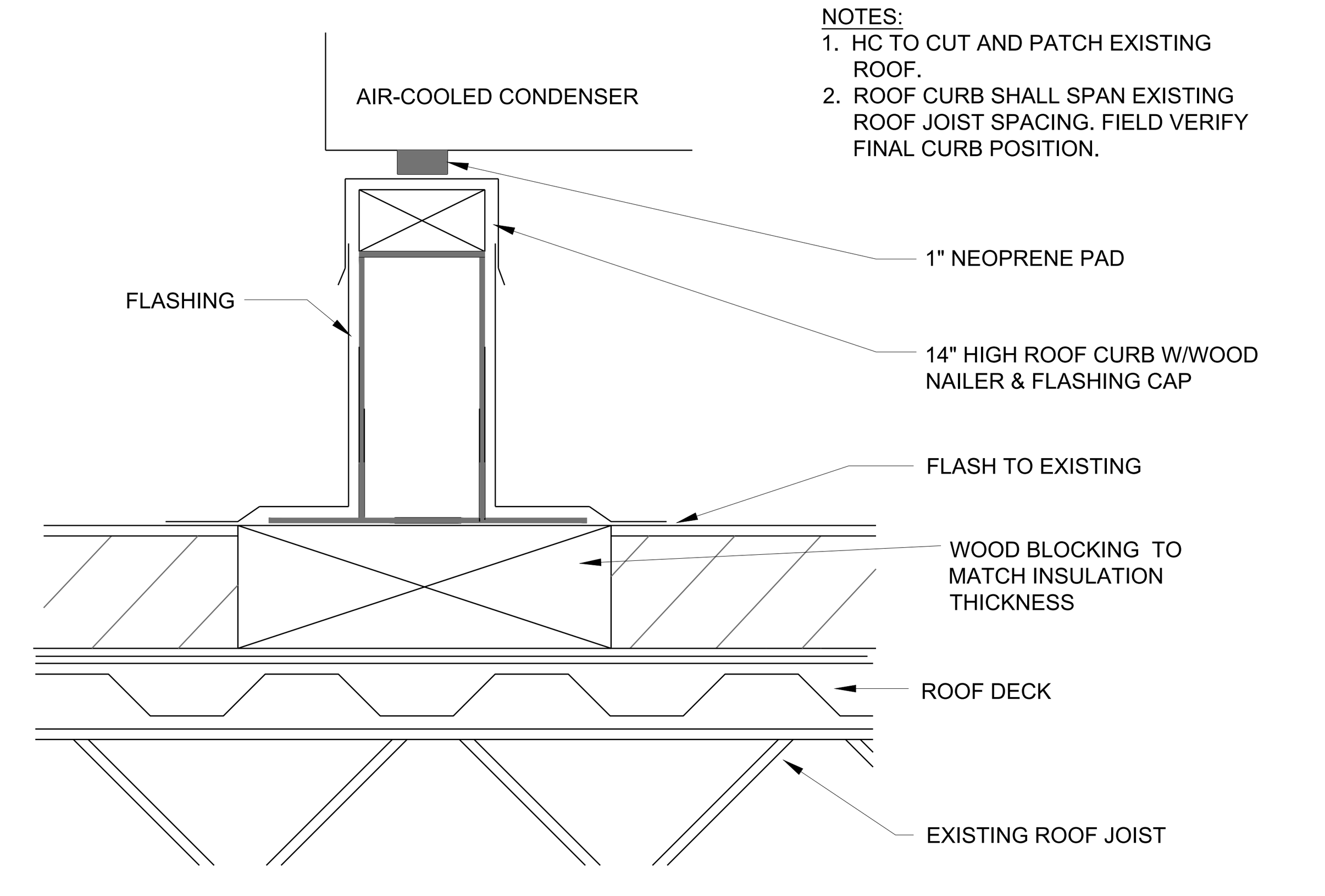
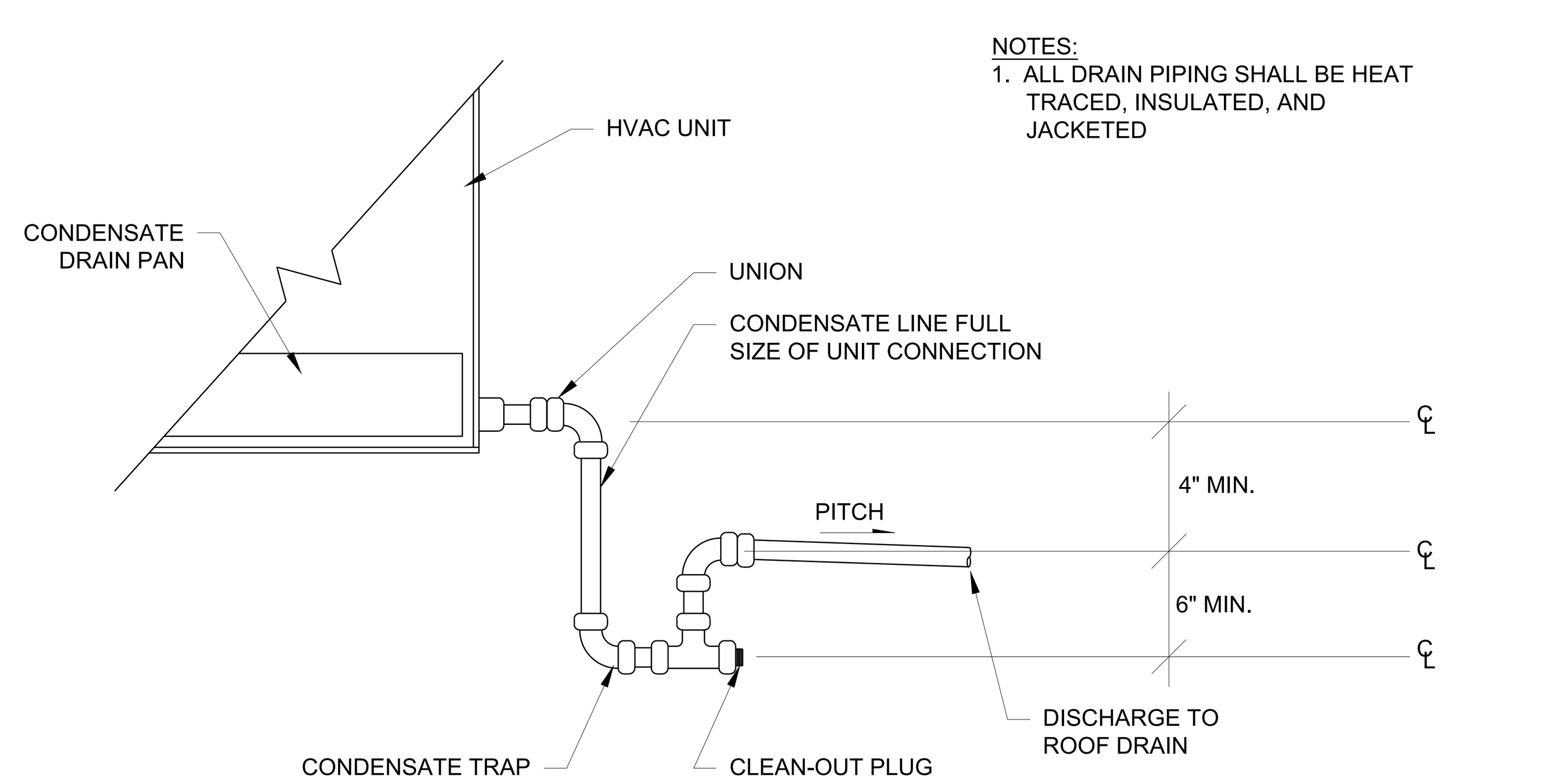


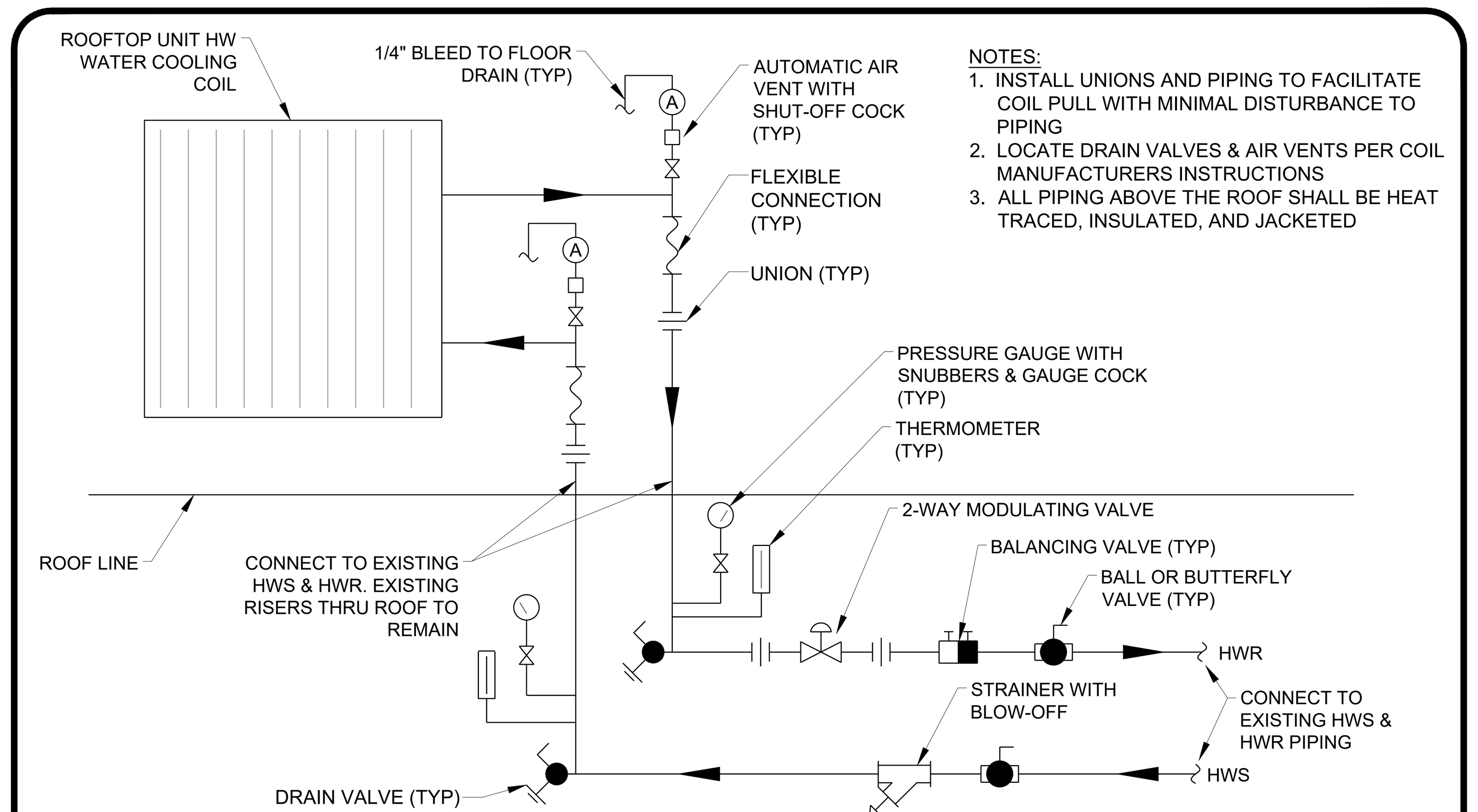
EXHAUST FAN ROOF CURB DETAIL
NOT TO SCALE



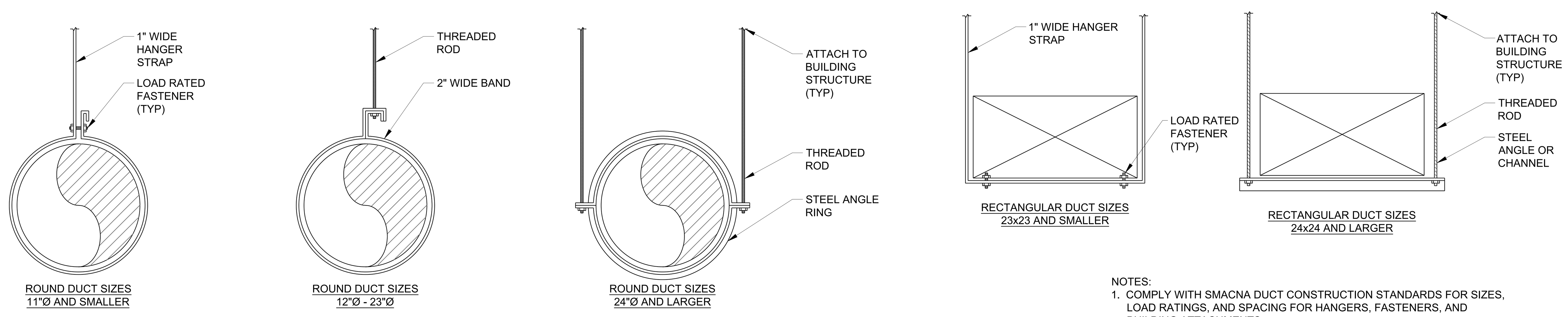
EQUIPMENT SUPPORT CURB DETAIL
NOT TO SCALE



CONDENSATE TRAP DETAIL
NOT TO SCALE

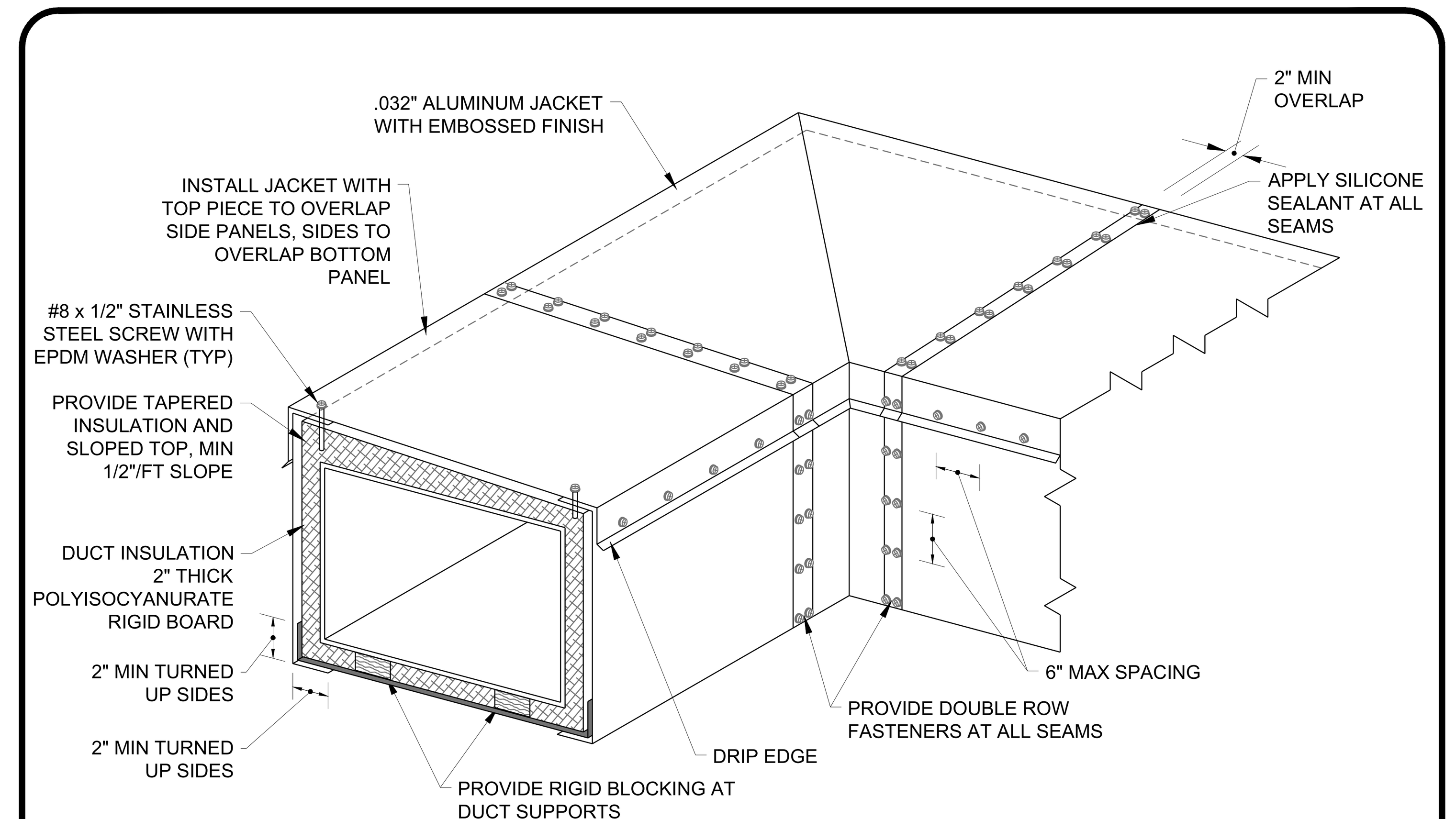


ROOFTOP HW COIL PIPING DIAGRAM: 2-WAY VALVE
NOT TO SCALE



NOTES:
1. COMPLY WITH SMACNA DUCT CONSTRUCTION STANDARDS FOR SIZES, LOAD RATINGS, AND SPACING FOR HANGERS, FASTENERS, AND BUILDING ATTACHMENTS
2. HANGER AND FASTENERS MATERIALS SHALL MATCH OR BE COMPATIBLE WITH DUCT MATERIALS
3. PRIME AND PAINT HANGERS EXPOSED WITHIN FINISHED SPACES

DUCT HANGER DETAILS
NOT TO SCALE



OUTDOOR DUCT JACKET DETAIL
NOT TO SCALE

1

CHA

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POOL DEHUMIDIFICATION
FOR
COUNCIL ROCK SCHOOL DISTRICT NORTH HIGH SCHOOL
62 SWAMP ROAD
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No.	Submittal / Revision	Apv	By	Date
1	ADDENDUM 2	...	...	02/13/25

DETAILS

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Issue Date:	Project No.:	Scale:
02/03/25	099729	AS SHOWN

Drawing No.:
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ROOFTOP DEHUMIDIFICATION UNIT SCHEDULE

DHU #

TAG	MANUFACTURER	MODEL	SUPPLY AIR FAN							EXHAUST AIR FAN						DX COOLING COIL (NOTE 3)			
			SUPPLY CFM	O/A (1) CFM	O/A (2) CFM	ESP IN WG	QTY. OF FANS	DRIVE	HP (EACH)	E/A (1) CFM	E/A (2) CFM	ESP IN WG	QTY. OF FANS	DRIVE	HP (EACH)	TOT CAP MBH	SENS. CAP MBH	EAT/DB °F	EAT/WB °F
DHU-1	DESERT AIRE	SA24EG4MCH	8190	2200	2200	1.3	1	BELT	7.5	2420	2420	0.0	1	BELT	7.5	312.4	164.4	82.0	71.4
DHU-2	DESERT AIRE	SA24EG4CCH	9200	1400	2800	1.1	1	BELT	7.5	1540	3080	0.0	1	BELT	7.5	312.4	164.4	82.0	71.4

TAG	POOL WATER HEAT EXCHANGER	HOT WATER HEAT (1)						COMPRESSORS/ REFRIG. CKT.			ELECTRICAL DATA			NOMINAL DIMENSIONS LxWxH (FT)	OPER. WT. LBS	NOTES
		EAT/DB °F	LAT/DB °F	EWT/LWT	GPM	WPD	MBH	QTY.	REFRIG. TYPE	REFRIG. LBS.	V/P/Hz	MCA	MOCP			
DHU-1	YES	70	97.9	180/160	24.0	10.0	248	2	R454B	163	460/3/60	62	80	18'-3" x 7 x 5	6400	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
DHU-2	NO	62	95.0	180/160	30.0	10.0	325	2	R454B	163	460/3/60	62	80	18'-3" x 7 x 5	6400	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

NOTES:
1. PROGRAM AND BALANCE MINIMUM OUTDOOR AIR RATE (1) AND EXHAUST AIR RATE (1) FOR NORMALLY OCCUPIED MODE, MINIMAL OCCUPANCY.
2. PROGRAM AND BALANCE MINIMUM OUTDOOR AIR RATE (2) AND EXHAUST AIR RATE (2) FOR SWIMMING EVENT.
3. ENTERING AIR BASED ON 82°F DB/56% RH INDOOR AIR AND 95°F DB/75°F WB OUTDOOR AIR, AIRFLOW RATES PER NOTE 2.
4. PROVIDE CUSTOM CABINET DIMENSIONS TO SUIT EXISTING ROOF FRAMING DIMENSIONS VS DUCT CONNECTIONS. HC TO FIELD VERIFY AND COORDINATE DIMENSIONS.
5. PROVIDE HOUSED SPRING VIBRATION ISOLATION, 1" DEFLECTION HOUSING.
6. PROVIDE FACTORY MOUNTED AND WIRED UNIT CONTROLLER W/ BMS INTERFACE (BACNET MS/TP)
7. PROVIDE 460/3/60 TO 120/1/60 CONTROL TRANSFORMER FOR CONTROL AND MISCELLANEOUS CIRCUITS.
8. PROVIDE SINGLE POINT POWER CONNECTION, EC TO PROVIDE FUSED DISCONNECT SWITCH.

CONDENSER SCHEDULE

ACC #

TAG	MANUFACTURER	MODEL No.	HEAT REJECTION MBH	AMB TEMP.°F	NO. OF CIRCUITS	REFRIG	CONDENSER FANS		MCA	MOCP	V/P/Hz	OPER WT LBS	NOTES
							No.	HP					
ACC-1	DESERT AIRE	RC8S018C	18	100	2	R454B	2	1.5	8.1	15.0	460/3/60	870	1, 2
ACC-2	DESERT AIRE	RC8S018C	18	100	2	R454B	2	1.5	8.1	15.0	460/3/60	870	1, 2

(1)

NOTES:
1. PROVIDE DISCONNECT SWITCH.
2. ~~PROVIDE CONTROL INTERLOCK WITH ASSOCIATED DHU.~~
3. CONTROLLED BY DHU MANUFACTURER, FIELD WIRING BY ATC CONTRACTOR. (1)

FAN SCHEDULE

EF # SF #

TAG	AREA SERVED	MANUFACTURER	MODEL	CFM	ESP IN WG	DRIVE	SONES	MOTOR			ROOF OPENING INxIN	CONTROL	DAMPER	WEIGHT LBS	NOTES
								HP (WATTS)	RPM	V/P/Hz					
EF-1	POOL	CAPTIVE AIRE	DR180HFA	2750	.75	DIRECT	11.4	1.5	1078	460/3/60	26.5X26.5	BAS	MOTORIZED	225	1, 2, 3, 4
EF-2	POOL	CAPTIVE AIRE	DR180HFA	2750	.75	DIRECT	11.4	1.5	1078	460/3/60	26.5X26.5	BAS	MOTORIZED	225	1, 2, 3, 4

(1)

NOTES:
1. PROVIDE VFD WITH DISCONNECT SWITCH, VIBRATION ISOLATION AND INSULATED HEAT BAFFLE.
2. INCORPORATE INTO EXISTING BMS.
3. PROVIDE CORROSION RESISTANT COATINGS.
4. PROVIDE 14" ROOF CURB.

GRILLE - REGISTER - DIFFUSER SCHEDULE

CFM

TAG	MANUFACTURER	MODEL	SIZE	PATTERN	FINISH	MAX NC	NOTES
1	TITUS	63F	18X42	EXHAUST	BWE	25	1

(1)

NOTES:
1. ALUMINUM CONSTRUCTION (1)

HEAT TRACE SCHEDULE

TAG	MANUFACTURER	MODEL	WATT / FT	VOLTS	CONTROLLER	NOTES
HT-1	CHROMALOX	CRP	5.0	277/1/60	CET-GF	1, 2
HT-2	CHROMALOX	CRP	5.0	277/1/60	CET-GF	1, 2
HT-3	CHROMALOX	CRP	5.0	277/1/60	CET-GF	1, 2
HT-4	CHROMALOX	CRP	5.0	277/1/60	CET-GF	1, 2
HT-5	CHROMALOX	CRP	5.0	277/1/60	CET-GF	1, 2

NOTES:
1. CONNECT TO EXISTING POWER CIRCUIT. FIELD VERIFY VOLTAGE PRIOR TO ORDER.
2. PROVIDE GROUND FAULT PROTECTION.

(1)

Run the "Logo Address" Command From the Universal Ribbon Tab or type "Cha_LogoAddress"

POOL DEHUMIDIFICATION
FOR
COUNCIL ROCK SCHOOL DISTRICT NORTH HIGH SCHOOL
62 SWAMP ROAD
NEWTOWN, PENNSYLVANIA

No.	Submittal / Revision	Apv	By	Date
1	ADDENDUM 2	---	---	02/13/25

SCHEDULES

Designed By:	Drawn By:	Checked By:
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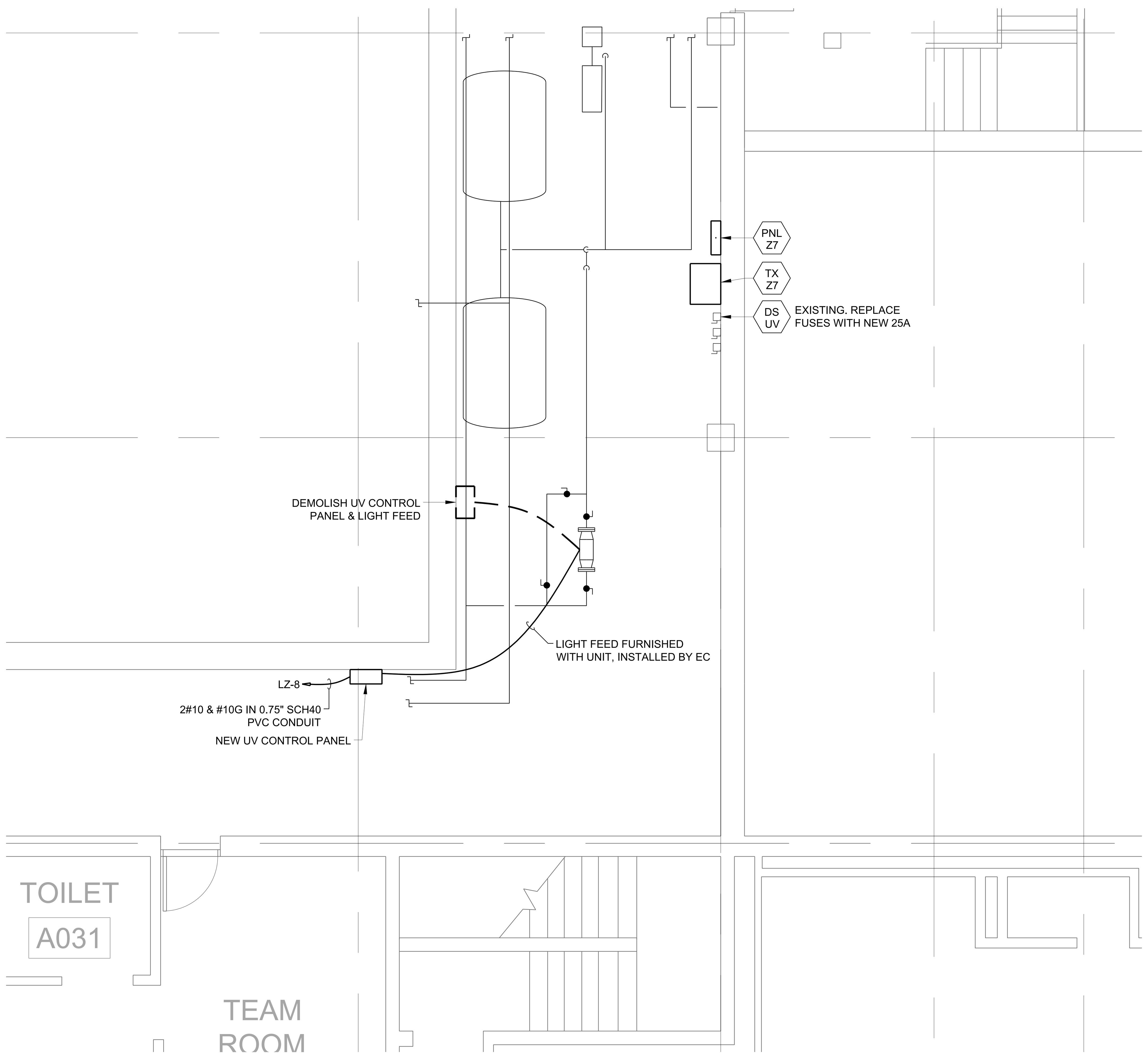
Issue Date:	Project No.:	Scale:
02/03/25	099729	AS SHOWN

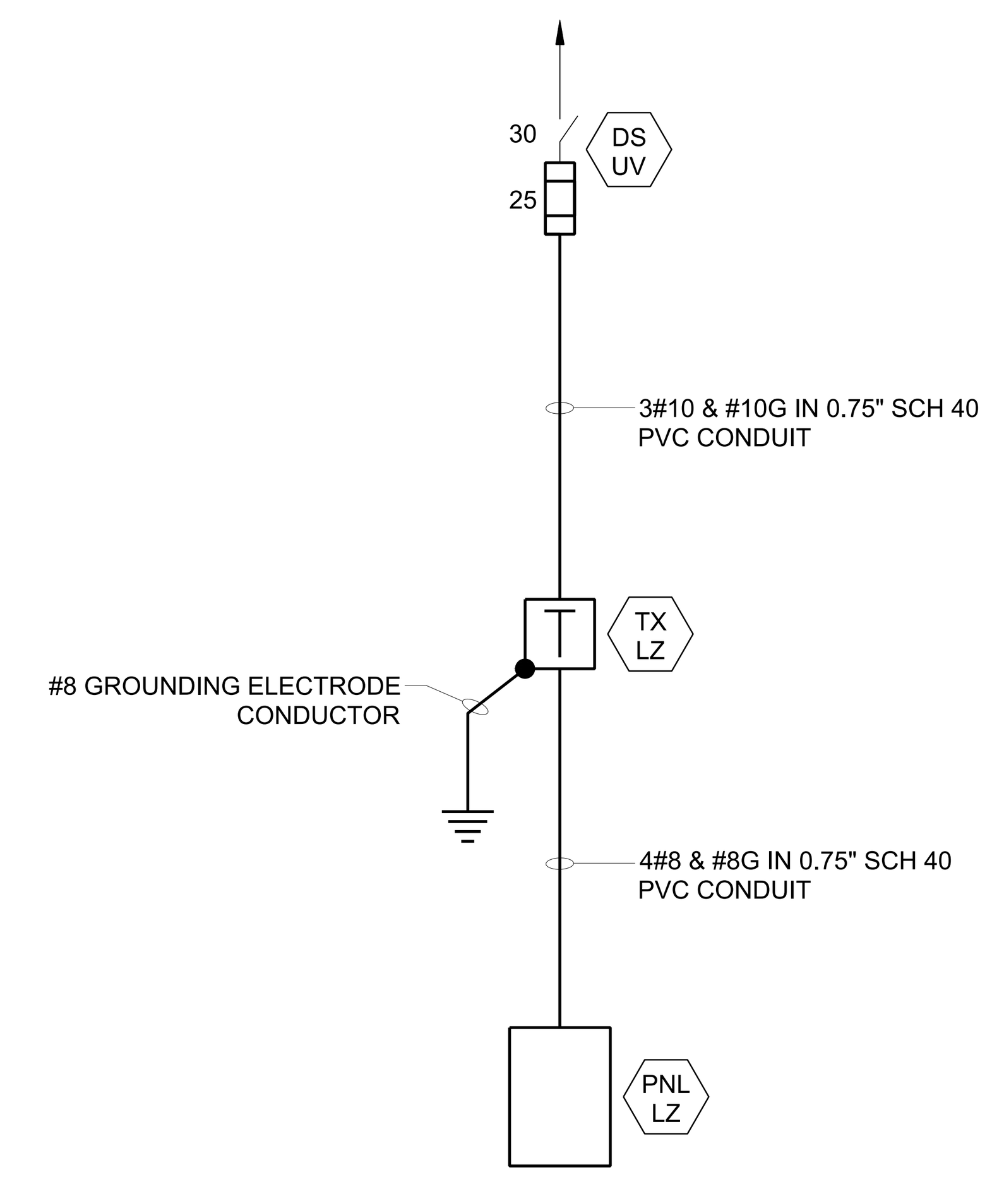
Drawing No.: H8.1



N

POOL FILTER ROOM

0 1' 2' 4' 8'
Scale: 1/4" = 1'-0"



PARTIAL SINGLE LINE DIAGRAM

NO SCALE

LZ 208 Y/120V, 3Ø, 4W

Circuit Num.	Poles	Size	Load (VA)	Description	A	B	C	Description	Load (VA)	Size	Poles	Circuit Num.
1	1	20	0	Spare	0			Main		50	3	2
3	1	20	0	Spare		0						4
5	1	20	0	Spare			0					6
7	1	20	0	Spare	2000			UV system	2000	30	2	8
9	1	20	0	Spare		2000			2000			10
11	1	20	0	Spare			0	Spare	0	20	2	12
13				Prepared space	0				0			14
15				Prepared space		0		Prepared space				16
17				Prepared space			0	Prepared space				18
19				Prepared space	0			Prepared space				20
21				Prepared space		0		Prepared space				22
23				Prepared space			0	Prepared space				24
				Totals	2000	2000	0					

Circuit breaker panelboard
Hinged door-in-door cover
Bolt-on breakers
50A MCB, 100A bus
NEMA 3R surface-mounted enclosure
10kA SCCR
Ground bar

Balanced connected load: 11 A

Transformer Schedule

Tag	Size	Primary Voltage	Secondary Voltage	Notes
TX-LZ	15kVA	480Δ	208Y/120V	Non-ventilated, resin encapsulated, wall-mount, provide bracket

1 NEW SHEET

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POOL DEHUMIDIFICATION
FOR
COUNCIL ROCK
SCHOOL DISTRICT
NORTH HIGH SCHOOL
62 SWAMP ROAD
NEWTOWN, PENNSYLVANIA

No.	Submittal / Revision	Apv	By	Date
1	ADDENDUM 2	---	---	02/13/25

POOL
FILTER
ROOM

Designed By:	Drawn By:	Checked By:
DB	MM	DB
Issue Date:	Project No.:	Scale:
02/03/25	099729	AS SHOWN

Drawing No.:
E3.0

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GENERAL NOTES

1. THE WORK SHOWN ON THESE DRAWINGS HAS BEEN DESIGNED IN ACCORDANCE WITH THE STRUCTURAL REQUIREMENTS OF THE 2018 INTERNATIONAL BUILDING CODE AND ASCE 7-16.

2. THE STRUCTURAL COMPONENTS HAVE BEEN DESIGNED FOR THE FOLLOWING LOADS MANUFACTURED BY DESERT AIRE AND DATED 01/30/2025 PRODUCT SUBMITTAL:
   * DUH-1:............................ 6,400# PLUS CURB
   * DUH-2:............................6,400# PLUS CURB
   * SERESCO DEHUMIDIFIED AIR SOLUTIONS - DEHUMIDIFIER ......1200# PLUS CURB

3. DESIGN LOADS:
   ROOF DEAD LOAD = 20 PSF
   RISK CATEGORY III, Is = 1.1, AND Ie = 1.25
   SNOW LOAD pf= 21 PSF FLAT ROOF
   SNOW DRIFT LOADS:
      NORTH ROOF: pc = 66 PSF, DRIFT WIDTH = 14'-0"
      SOUTH ROOF: pd = 79 PSF, DRIFT WIDTH = 17'-0"
      WEST ROOF: pd = 65 PSF, DRIFT WIDTH = 14'-0"
      EAST ROOF: pd = 58 PSF, DRIFT WIDTH = 12'-6"
   WIND SPEED = 124 MPH ULTIMATE, EQUIPMENT WIND FORCE qh = 27.7 PSF ULTIMATE
   SEISMIC FORCES
      Sds = 0.213, Sd1 = 0.079, SEISMIC DESIGN CATEGORY = B

4. THE PORTIONS OF THE EXISTING STRUCTURE AFFECTED BY THIS WORK HAVE BEEN ANALYZED USING THE LOADS LISTED ABOVE AND FOUND TO BE CAPABLE OF SUPPORTING THE ADDITIONAL LOADS , EXCEPT WHERE STRENGTHENING WORK IS IMPOSED BY THIS WORK INDICATED ON THE PLANS.

5. SOME DETAILS OF THE WORK ARE SHOWN ON THE MECHANICAL DRAWINGS, A CAREFUL REVIEW AND STUDY OF THESE DETAILS IS NECESSARY BEFORE THE FULL SCOPE OF THE WORK CAN BE COMPREHENDED.

6. THIS STRUCTURE HAS BEEN DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE MODIFICATION OF THE SUPPORTING STRUCTURE HAS BEEN COMPLETED. THE STABILITY OF THE STRUCTURE PRIOR TO COMPLETION IS SOLELY THE RESPONSIBILITY OF THE CONTRACTOR. THIS RESPONSIBILITY EXTENDS TO ALL RELATED ASPECTS OF THE CONSTRUCTION ACTIVITY INCLUDING, BUT NOT LIMITED TO, ERECTION METHODS, ERECTION SEQUENCE, TEMPORARY BRACING, SHORING, USE OF EQUIPMENT, AND SIMILAR CONSTRUCTION PROCEDURES. REVIEW OF THE CONSTRUCTION BY THE ENGINEER IS FOR CONFORMANCE WITH DESIGN ASPECTS ONLY, NOT TO REVIEW THE CONTRACTOR'S CONSTRUCTION PROCEDURES. LACK OF COMMENT ON THE PART OF THE ENGINEER WITH REGARD TO CONSTRUCTION PROCEDURES IS NOT TO BE INTERPRETED AS APPROVAL OF THOSE PROCEDURES.

7. JOB SITE SAFETY IS SOLELY THE RESPONSIBILITY OF THE CONTRACTOR. REVIEW OF THE CONSTRUCTION BY THE ENGINEER IS FOR CONFORMANCE WITH DESIGN ASPECTS ONLY, NOT TO REVIEW THE CONTRACTOR'S PROVISIONS FOR JOB SITE SAFETY. LACK OF COMMENT ON THE PART OF THE ENGINEER WITH REGARD TO JOB SITE SAFETY IS NOT TO BE INTERPRETED AS APPROVAL OF JOB SITE SAFETY ASPECTS.

8. IF FAULTY CONSTRUCTION PROCEDURES, OR MATERIAL, RESULT IN DEFECTIVE WORK THAT REQUIRES ADDITIONAL ENGINEERING TIME TO DEVISE CORRECTIVE MEASURES, PROFESSIONAL FEES MAY BE CHARGED TO THE CONTRACTOR AT THE STANDARD HOURLY RATE OF ADDITIONAL SERVICES. SUCH FEES MAY BE WITHHELD FROM THE CONTRACTOR'S PAYMENT.

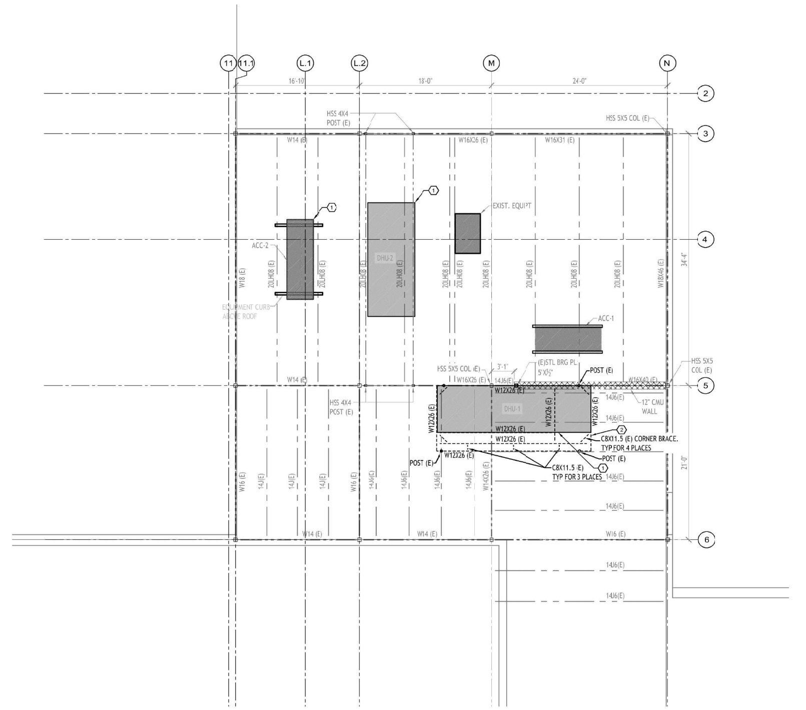
STRUCTURAL STEEL NOTES:

1. DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO THE "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS", AS ADOPTED AUGUST 1, 2022 BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION, LATEST EDITION.

2. MATERIALS
   BEAMS...ASTM 992, Fy = 50 ksi, GALVANIZED.
   POSTS...ASTM A500, GRADE C, GALVANIZED.
   PLATES, ANGLE, AND RODS .... ASTM A-36, GALVANIZED.
   BOLTS .... ASTM F3125 Gr A325, GALVANIZED.
   WELDING ELECTRODE .... ASTM E 7CXX LOW HYDROGEN

3. ALL WELDING SHALL CONFORM TO THE CODE FOR ARC AND GAS WELDING IN BUILDING CONSTRUCTION OF THE AMERICAN WELDING SOCIETY, AND BE PERFORMED BY A CERTIFIED WELDER IN ACCORDANCE WITH A.W.S. STANDARDS.

4. CERTIFICATES OF COMPLIANCE ARE REQUIRED TO BE SUBMITTED TO THE ENGINEER FOR STRUCTURAL STEEL, BOLTS, NUTS, WASHERS, AND WELD FILLER MATERIAL PRIOR TO THE FABRICATION OF ANY STEEL.



ROOF PLAN - DEMOLITION

Scale: 1/8" = 1'-0"

DEMO PLAN SYMBOLS LEGEND:

1 REMOVE EXISTING ROOF TOP UNIT

2 REMOVE EXISTING DUNNAGE

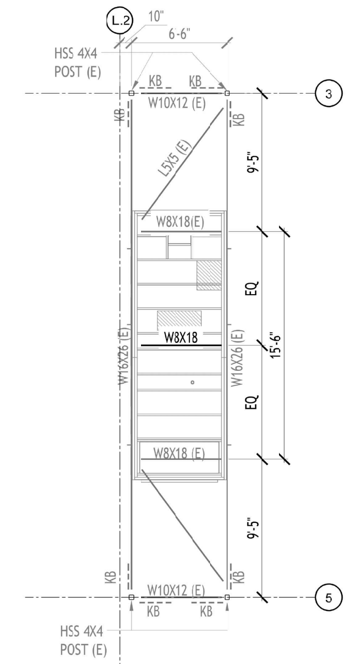
POOL DEHUMIDIFICATION
FOR
COUNCIL ROCK SCHOOL DISTRICT NORTH HIGH SCHOOL
62 SWAMP ROAD
NEWTOWN, PENNSYLVANIA

No.	Submittal / Revision	Apv	By	Date
2	ADDENDUM 2	---	---	02/13/25
1	ADDENDUM 1	---	---	02/12/25

GENERAL NOTES AND DEMO PLAN

Designed By:	Drawn By:	Checked By:
MP	MRF	XXX
Issue Date:	Project No.:	Scale:
02/03/25	099729	AS SHOWN

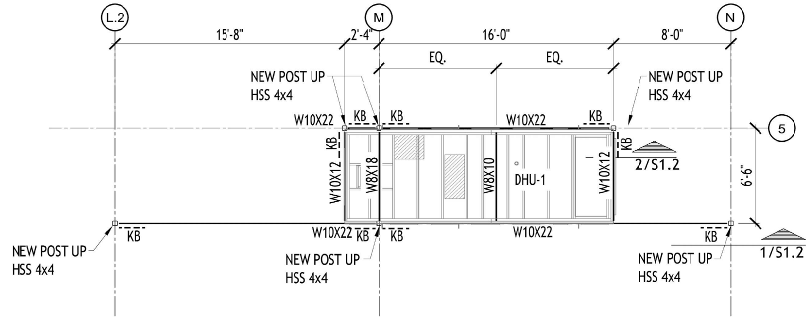
Drawing No.:
S1.1



DHU-2 DUNNAGE FRAMING PLAN

Scale: 1/4" = 1'-0"

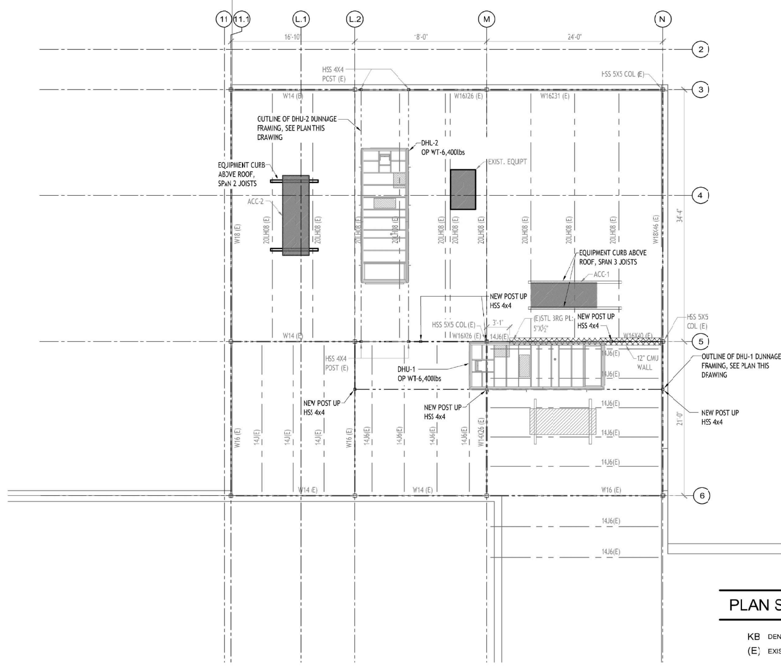
NOTES:
1. REFER TO GENERAL NOTES DRAWING S1.1 FOR MATERIAL SPECIFICATIONS.



DHU-1 DUNNAGE FRAMING PLAN

Scale: 1/4" = 1'-0"

NOTES:
1. REFER TO GENERAL NOTES DRAWING S1.1 FOR MATERIAL SPECIFICATIONS.

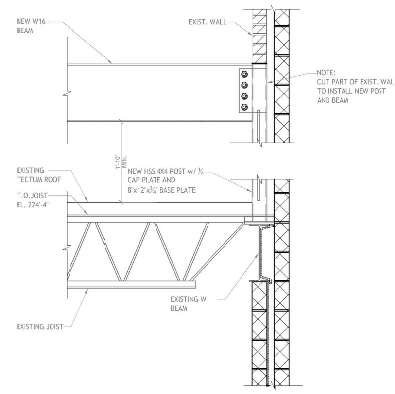


OUTLINE OF DHU-2 DUNNAGE FRAMING, SEE PLAN THIS DRAWING
DHU-2 OP WT-6,400lbs
EXIST. EQUIPT
EQUIPMENT CURB ABOVE ROOF, SPAN 2 JOISTS
ACC-2
EQUIPMENT CURB ABOVE ROOF, SPAN 3 JOISTS
ACC-1
NEW POST UP HSS 4x4
HSS 5X5 COL (E)
DHU-1 OP WT-6,400lbs
12" CMU WALL
OUTLINE OF DHU-1 DUNNAGE FRAMING, SEE PLAN THIS DRAWING
NEW POST UP HSS 4x4

ROOF PLAN - NEW EQUIPMENT SUPPORT FRAMING PLAN

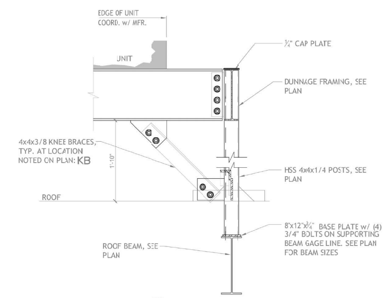
Scale: 1/8" = 1'-0"

NOTES:
1. REFER TO GENERAL NOTES DRAWING S1.1 FOR MATERIAL SPECIFICATIONS.
2. REFER TO MECHANICAL DRAWINGS FOR ROOF PENETRATIONS, CURB DETAILS, AND EQUIPMENT SPECIFICATIONS.



1 S1.2 SECTION

SCALE: 3/4"=1'-0"



EDGE OF UNIT COORD. w/ MFR.
UNIT
½" CAP PLATE
DUNNAGE FRAMING, SEE PLAN
4x4x3/8 KNEE BRACES, TYP. AT LOCATION NOTED ON PLAN: KB
ROOF
HSS 4x4x1/4 POSTS, SEE PLAN
ROOF BEAM, SEE PLAN
8"x12"x¾" BASE PLATE w/ (4) 3/4" BOLTS ON SUPPORTING BEAM GAGE LINE. SEE PLAN FOR BEAM SIZES

2 S1.2 SECTION

SCALE: 3/4"=1'-0"

NOTES:
1. GALVANIZE ALL EXTERIOR STEEL

PLAN SYMBOLS LEGEND:

KB DENOTES KNEE BRACE

(E) EXISTING MEMBER

CHA

Run the "Logo Address" Command From the Universal Ribbon Tab or type "Cha_LogoAddress"

POOL DEHUMIDIFICATION FOR

COUNCIL ROCK SCHOOL DISTRICT NORTH HIGH SCHOOL

62 SWAMP ROAD

NEWTOWN, PENNSYLVANIA

No.	Submittal / Revision	Apv	By	Date
2	ADDENDUM 2	...	...	02/13/25
1	ADDENDUM 1	...	...	02/12/25

NEW EQUIPMENT SUPPORT FRAMING PLAN AND DETAILS

Designed By:	Drawn By:	Checked By:
MP	MRF	XXX
Issue Date:	Project No.:	Scale:
02/03/25	099729	AS SHOWN

Drawing No.:

S1.2