



Performance Specifications for the Installation of a New High
Efficiency Air to Water Heat Pumps, Hydronic Unit Heaters
and associated HVAC work

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If you have any questions, please call Roger S. Harris at RISE Engineering: (413) 519-7542. Thank you.

Note to installer: This specification set must be given to the on-site installers in order for them to fully comprehend the installation of the work. At the completion of work this specification can be used as a checklist to ensure the work is fully inclusive of the contract requirements. This specification is an integral part of the contract to be executed for the work.

NOTICE: See plan disclaimers. This design is preliminary until additional issues are resolved.

Dated: 7/9/26



1. Equipment and Site

- a. Provide and install two (2) new fan coil units and two (2) hydronic unit heaters. See the Equipment Schedule on the M-5.0 plan.
- b. Provide and install three (3) new air-to-water heat pump (hereafter referred to as the AWHP) system. The AWHP system shall incorporate variable speed condenser motors and variable speed compressors. Heating operation shall be available from at least 0°F until at maximum of 60°F outside temperatures. Heating supply water leaving water temperatures (LWT) shall be available from a minimum of 90°F to 120°F.
- c. Provide and install two (2) insulated buffer tank in the current Boiler Room. The tank shall provide the prop. glycol system with sufficient volume to provide improved temperature control. The buffer tank shall have a minimum of two (2), two to three inch flanged connections on opposite sides of the tank. Each tank shall have accessible isolation and by-pass valves.
- d. Mount the new AWHPs and associated piping on the outside wall of the Apparatus Room at a minimum of two feet above grade. The basis of design AWHP units are each 263 pounds.
- e. Install new hydronic balancing valves (one for existing hydronic loop and one for new hydronic loop) as functional to the new system.
- f. For each AWHP, a Start-Up Check List Sheet must also be completed and provided to RISE Engineering and the building owner.
- g. Provide and install two (redundant) new fluid pumps for the glycol loop as specified on the Equipment Schedule. Grundfos, Taco or approved equal pumps by Bell & Gossett can be submitted for review. Pumps shall be suitable to operate with 35% propylene glycol.
- h. The new system shall be protected from iron oxide deposits by a new Calefi Dirtmag magnetic dirt separator, with ball drain valve. Install in an accessible location for service on the distribution system main return pipe. The separator shall serve the new water loop.
- i. The magnetic separator shall be labeled with service requirements and recommended service intervals.
- j. Provide Service Record/Lockout Incident chart sheets in clear plastic sleeves for each of the following equipment: each new HUH, HWP and AWHP.
- k. Provide and install new mechanical and pipe insulation as noted below.
- l. Provide and install new collection pans under the expansion tank, glycol tank, buffer tanks and pumps with a float switch to protect the building from leaks. Float switch shall be wired turn off the pumps in the event of a sensed leak. These pans must be installed as part of this current project also for potential future air conditioning use of the system.
- m. New equipment shall be located at least three feet from the front of electrical panels and three feet from the front and side of any main sprinkler valves, as applicable.
- n. Equipment shall be installed in accordance with the manufacturer's instructions and applicable codes. If there is a question about a conflict between any instructions on a detail, the installing contractor shall contact RISE Engineering to resolve the issue before work commences.
- o. Conduct testing and balancing for the new system as noted in section 6 below.

- p. Equipment installed shall have all necessary ancillary equipment for the proper, safe and efficient functioning of the complete system. This includes but is not limited to proper supports and seismic restraints for equipment installed where applicable.
- q. Equipment shall be installed in a location so as to not prevent maintenance of adjacent equipment and to allow new equipment to be serviced properly.
- r. The installation will have a one year labor and materials warranty by the installing contractor. In addition, there may be longer manufacturer's materials warranties which will apply.
- s. Any piping, ductwork or unit venting which penetrates a bonded roof or is roof currently under warranty shall be done under this contract by the roof installer as a contractor of the building owner. Coordinate roof equipment work with the new roofing contractor and building owner.
- t. All of above equipment will be provided with adequate manufacturer service manuals and warranty. See the applicable section of this document for more details.
- u. All equipment provided and installed shall be current models as shown in the manufacturer's catalog with replacement parts readily available.
- v. Provide all necessary cutting and patching of ceilings, floors, partitions, walls and other surfaces as necessary for the installation of mechanical (and related electrical and plumbing) work in this and other sections.
- w. Provide and install any necessary thermostat wiring or other interfaces from new air handling units.
- x. Provide all necessary and specified controls and start up for all installed equipment. All controls shall be fully commissioned, tested and adjusted. The set points shall be provided to the building owner and RISE Engineering in an electronic document.
- y. Each new HUHs, FCUs and AWHPs shall each be labeled with installation date, installing contractor's name and service phone number and reference number.
- z. Provide and install any necessary hydronic specialties including piping, ancillary components, full port ball valves, and an ASME heating expansion tank to make the system fully operable. Full port ball valves and a manual air vent are required on each new HUH and FCU.
- aa. Staging, Planking and Scaffolding: The HVAC subcontractor shall furnish, install and maintain in safe and adequate condition, all staging, planking and scaffolding up to eight feet in height that is necessary for the proper execution of the Work in this Section.
- bb. Provide cleaning of the piping and outside cabinets of the new systems installed before the HVAC system is accepted by the owner.
- cc. Hoisting Equipment: The HVAC subcontractor shall furnish, install and maintain in safe and adequate condition all mechanical hoisting equipment, operating personnel and rigging that is necessary for the proper execution of the Work of this Section.
- dd. Provide detailed submittals for all equipment and materials to be used on this project prior to ordering or installing the equipment. Incomplete or incorrect supplier submittals will be returned for re-submittal. If the equipment cut sheets are not properly marked up to show acceptance of optional features, they will be returned without approval. Equipment will not be reviewed until the associated equipment submittal is provided. For example, to review the heat exchanger, the submittal for the associated pumps must be provided. The installing contractor is responsible for adjusting all installation electrical, piping, flue, etc. variables for installing an alternative "or equal" product.

- ee. Submittals for review shall indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements.
- ff. Each equipment and material item for this project shall be delivered, stored, protected and handled to the site in a good workmanship like manner. Products will be accepted in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage prior to the start of work. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish. The Mechanical Contractor is responsible for all necessary rigging of the new equipment into the designated locations shown on the plan.
- gg. Cover supply and return insulated heating piping with white hard plastic “hide a pipe” enclosure if it will be run through finished Lobby space.
- hh. Do not use site water for mixing with propylene glycol in the new system. The prop. glycol must be pre-mixed off site at the supplier or manufacturer with distilled water. **Glycol mixture volume must be sufficient to fill entire connected hydronic loop in this building, not just for the Apparatus Room.**
- ii. Mechanical contractor will need to test the final 35% prop. glycol mixture for freeze protection and note the Ph, Freeze point and burst point clearly in the Mechanical Room on a dated test sheet within a wall-posted plastic clear sleeve for future maintenance reference.

2. Heating and Condensate Piping

- a. The building shall properly support all piping; piping shall not be supported by the equipment cabinet. Dead leg pipe supports on the floor are not allowed. Pipe support mechanisms shall be fastened in a secure manner to the building structure with appropriate anchors, bolts, concrete inserts and/or uni-strut.
- b. Install piping in a manner which allows for expansion and contraction without undue stress upon the piping, hangers, fittings or connected equipment. Although the system will be primarily used for cooling, it shall be functional for heating should the need arise. With the initial run in heating, the system shall be able to most efficiently eliminate air within the piping system.
- c. **Mechanical joints shall only be allowed in exposed or easily accessible locations. Do not install mechanical joints over the circuit breaker panels and other critical electronic components of the system or within wall or floor cavities.**
- d. Pumps shall **NOT** be run dry to check rotation. Prime the pumps, vent all air from the casing and verify that the rotation is correct. To avoid damage to mechanical seals, never start or run the pump in dry condition.
- e. Pumps must be mounted in a pump manufacturer approved configuration to provide the specified rated flow and head output and to provide reasonable pump life.
- f. Install each new pump with necessary service clearances and have a full port isolation ball valve on each side.
- g. New piping shall not be installed with two 90° elbows back to back. 45° degree elbows shall be used whenever possible.
- h. The outlet side of each triple duty valve or flow check must have at least a foot of pipe length before any tees or elbows.

- i. Any new copper piping installed shall be type K or L. Schedule 40 black iron (threaded, “Victaulic” style or welded) is also allowed. “Vitaulic” style is acceptable if the contractor can show their installing mechanic has had training/experience in grooved pipe and clamp technology. Any welded steel piping shall be done using a certified American Welding Society (AWS) welder.
- j. Valves and pipes installed, as part of scope of work above, shall have flow arrows and functional labels (pipes) and I.D. tags (valves) to allow personnel easy identification of system function. Examples of functional labels include “Heating Water Supply” and “Heating Water Return”. Given the multiple areas of the building the systems will be located, the use of yellow plastic tags with actual function of valve clearly written on tag is preferable to numbered tags.
- k. Before system start up, first bleed air from components. The contractor must fully purge air out of the all terminal units as necessary.
- l. Pipe support mechanisms shall be fastened in a secure manner to the building structure with appropriate anchors, bolts, concrete inserts and/or unistrut. Spacing of supports shall be based upon the Manufacturers Standardization Standard (MSS) SP-69 with the following maximum spacing as a guide although short lengths of pipe still require supports. All piping shall be properly supported by the building, not by equipment cabinets. Support piping independent of each other and support vertical runs at each floor. **New hydronic piping and supports shall be augmented to comply with the following chart.**

<u>Hydronic Piping Nominal Size</u>	<u>Threaded Rod Diam.</u>	<u>Max. Spacing of Rod Sup.</u>
Up to 1 ¼”	1/4”	7 feet
1 ½ to 2”	3/8”	8 feet
2 ½ to 6”	½”	10 feet

- m. Piping support systems shall additionally comply with the following items:
 1. Provide an engineered piping support system with all hangers, supports and anchors designed and located by experienced technical pipe support specialists.
 2. All pipe hangers and supports, and selection and installation shall comply with MSS SP-58, SP-69, SP-89, SP-90, SP-127.
 3. All pipe hanger and support devices must be in compliance with specified MSS SP-58 type numbers, have published load ratings, and be products of engineered pipe support manufacturers.
 4. All pipe stresses and forces and moments on connecting equipment and structures shall be within the allowances of the ASME B31.1 Code, applicable building codes, and equipment manufacturer’s design limits.
 5. Piping that expands and contracts horizontally shall be supported by roller or sliding type hangers and supports except when long vertical hanger rods permit sufficient horizontal movement with the vertical angles of the rods less than 4 degrees.
 6. Piping that expands and contracts vertically shall be supported by engineered variable spring and spring cushion hangers. Utilize MSS SP-69 selection requirements and guidelines. Vibration isolator hanger types are not permitted.
 7. Seismic braces and shock absorbers shall be provided where required by code. Comply with MSS SP-127 design requirements and guidelines. Piping shall remain fully connected and supported under the design seismic events. Piping and connected equipment shall not be overstressed beyond Code limits during seismic events.
 8. Piping system anchors shall be engineered and located to control movement of piping that is subject to thermal expansion.
 9. Any existing pipe radiators and wall hung radiators to be reused are to be properly supported in accordance with this and other sections. Wall hung radiator supports must be able to carry the weight of the radiator full of water.
- n. Saddle trays for pipe insulation shall be provided and installed at intervals recommended by the pipe insulation manufacturer. Pipe hangers shall have appropriate diameter for specified pipe insulation and saddle trays.

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- o. Provide and install all hydronic specialties for this job including new water feed ball valves, flow checks, and return header strainer. Provide a new minimum 100 psig gauge for water pressure after the feed valve. See the schematic piping plan.
- p. There shall be a new tricorder gauge (temperature and pressure) installed in a tee on the supply distribution line and a single return header temperature gauge to allow for monitoring. Furnish and install a round temperature and pressure gauge for each boiler's supply piping. Minimum 6" length, mercury-filled tube, adjustable angle thermometers shall be located at the supply and return to the main distribution header shall be Terice (or Taylor or approved equal) with a minimum of 30 to 200 degree F. scale for forced water applications.
- q. Install an air scoop with an automatic air vent.
- r. For the new heating pumps, install 60 psi compound pressure gauges and include gauge shut off cocks. Gauges shall have a 1-60 psi scale and a minimum of a 3 1/2" gauge face diameter. Gauges by Ametek, Ashcroft, or Taylor or other approved equals.
- s. **Use dielectric fittings on all connections between copper or brass to stainless steel, between copper or brass to cast iron or from copper or brass to steel piping.** For potable water piping, any connections between brass and copper must also have dielectric fittings.
- t. All valves shall be minimally rated for 125 psi. All ball valves shall be full port valves.
- u. Set the distribution pump flow at the highest rate as an initial setting until the air is fully bled from the modified hydronic system. Run the AWHP system in heat mode for air bleeding.
- v. Provide and install Mason Industries (or approved equal by others) seismic rated secondary support cables and joints accordingly:
 - 1. Floor mounted equipment, expansion tanks and water storage tanks require corner braces drilled into the concrete floor or pad.
 - 2. Seismic supports must have positive attachment, transverse and longitudinal bracing capabilities.
 - 3. Restraints must be installed in strict compliance with seismic codes, material, equipment and building construction standards and codes.
 - 4. The seismic support system manufacturer must provide submittals, installation instructions and shop drawings to the installing contractor and a representative of the Town of West Tisbury showing the seismic support system sizes and locations as applicable to this project. The manufacturer will provide the calculations on such systems as applied to the new HVAC equipment, applicable intake and exhaust ductwork and piping to show compliance with the current edition of the MA Building Code according to the "G" forces requirements shown for applicable zone.
 - 5. Piping will be addressed, except as noted below.
 - 6. Additional exceptions include:
 - i. Equipment weighing less than 400 pounds, which is supported directly on the floor or roof.
 - ii. Equipment weighing less than 20 pounds, which is suspended from the roof or floor or hung from a wall.
 - iii. Gas piping less than 2 1/2 inches inside diameter.
 - iv. Piping in boiler plants and equipment rooms less than 1 1/4 inches inside diameter.
 - v. All other piping less than 2 1/2 inches inside diameter.
 - vi. All piping suspended by individual hangers, 12 inches or less in length from the top of pipe to the bottom of the support for the hanger.
- w. Provide and install one new ASME grade expansion tank with an isolation and drain valve. One glycol compatible tank for the loop.

- x. Piping Joint Construction shall be as follows:
1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - i. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
 - ii. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
 - iii. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 - iv. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators.
 - v. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- y. An initial Hydrostatic pressure test of 80 PSI shall be conducted on the new mechanical piping for a period of not less than 5 hours. Tests shall be of such duration as necessary to ensure that the piping and accessories have been installed and piped correctly with no leaks or other improper operating conditions.
- z. Where new pipes pass through walls and floors, provide and install all necessary piping sleeves as follows:
1. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
 2. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
 3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.
 4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - i. Underdeck Clamp: Clamping ring with setscrews.
- aa. Install piping in a manner to permit valve servicing.
- bb. Pipe shall be cut accurately to measurements established at building, worked into place without springing or forcing; properly clearing all windows, doors and other openings. Excessive cutting or other weakening of building structure, to facilitate pipe installation will not be permitted. Pipe shall have burrs removed by reaming and so installed as to permit free expansion and contraction without damage to joints or hangers. Changes direction shall be made with fittings, except that bending of pipe will be permitted, provided a hydraulic pipe bender is used. Bent pipe showing kinks, wrinkles or other malformation shall not be acceptable. Horizontal mains shall pitch up in a direction of flow with a grade of not less than 1" in 40'. Piping connection to equipment shall be in accordance with details shown on drawings. Open ends of pipe lines to equipment shall be properly capped or plugged during installation to keep dirt or other foreign matter out of system. Install piping in a direct, neat manner to conform to field conditions, taking into consideration, appearance of final installation of minimum interference with other trades.
- cc. Equipment accessibility for operation and maintenance must be maintained. Proper clearance of existing and new piping to the installation of new electrical circuit breaker panels and other associated devices must be adhered to according to the Codes.

- dd. Offset piping as required to avoid fixed equipment, piping and structural members. Contractor shall locate all concrete, steel and wooden beams before installing any piping. Do not penetrate any beams without verification and approval from a professional structural engineer retained by the contractor.
- ee. Install the water pipe system so that the connections to the AWHP are correct, tight, and without leaks.
- ff. Add pressure gauges and thermometers on the water inlets and outlets adjacent to the AWHP to check system operation.
- gg. Include a strainer with minimum 50 mesh on the water inlet to filter particles that could enter the AWHP heat exchanger. Install the strainer on a horizontal pipe.
- hh. Before supplying distilled water/glycol mix, clean inside the pipe system to remove particles that will damage the AWHP.
- ii. Provide and install a fully isolated means within the Mechanical Room to add potable water to mix with the glycol in the AWHP loop and to maintain a minimum pressure in the loop. Provide a glycol feeder with pump to blend 35% prop. glycol into the piping loop. See the Equipment Schedule plan for details. When the project is certified as 100% complete, the glycol feeder tank shall have at least 66% of tank filled. Additionally, provide at least one five gallon container of spare distilled water/glycol mixture for future use.
- jj. Include flexible joints at the inlet /outlet pipes that reduce any vibration imparted to the water pipe system and AWHP system. Flexible joints help prevent water leaks caused by operation vibration.

3. Codes

Job to include all work necessary to complete task according to local, state and national codes including applicable permits. Copies of permits will be provided to the building owner and RISE Engineering before payment is made. **Permits must be pulled in advance of starting work.**

4. Mechanical Insulation

- a. All new heating supply and returns, within the building and outside to the new AWHP shall be insulated with 1 1/2" wall thickness, high density fiberglass. Pipes with a diameter of or larger than 1.5" shall be insulated with 2" wall thickness insulation.
- b. Tees, valves, open ends of pipe insulation and elbows shall be covered with appropriate plastic fittings. (No fiberglass shall be exposed.) Tops of check valves shall be left exposed. **All exterior insulation shall have a white plastic cover with all joints professionally caulked to protect the fiberglass insulation.**
- c. All pipe insulation shall be fiberglass type, meeting ASTM C 547 standard for Mineral Fiber Pre-formed Pipe Insulation, Type 1.

5. Water Flow Balance

- a. An independent water flow balance company hired by the Mechanical Contractor of record for this project will provide a report of the water flow from each new pump and at each HUH and FCU coil.

- b. The water balance company must be a totally separate independent entity from the mechanical contractor. All measurement instruments used by the balance company must have been calibrated within one year of the on-site measurement date.

6. Electrical Controls, Sequences of Operation, and Equipment Start Up

- a. Install the new AWHPs with a controls capable of modulating water temperature according to outside temperature. This includes both heating and chilled water reset which are part of the specified AWHP controller functions.
- b. Set the AWHP controllers to provide 90°F to 131°F supply water temperature as necessary to meet the Apparatus Room temperature setpoint.
- c. Provide and install one digital programmable thermostat that will interface with the new HUHs via a fan relay to be provided under this scope of work.
- d. Control the AWHPs, associated pumps, FCUs, and new HUHs to only operate during there is a heating demand.
- e. Install supply and return water temperature sensors as necessary to connect to the AWHP controller. Any sensor wires under pipe insulation for surface mount applications should be minimized to no more than an inch. Surface mount sensors are acceptable for copper piping; **well mounted sensors with heat conducting paste are required for steel pipe – no exceptions.**
- f. All wiring shall be performed in accordance with the requirements of the National Electrical Code and the local Electrical Inspector. This project shall include full system installation with all necessary control wiring.
- g. Rotate the use of the new redundant loop pumps on an automatic basis by a lead lag control. The specified pumps incorporate a pressure sensor to vary the flow as per the demand.
- h. In the heating mode of operation, the on-board controller for the AWHP unit shall stage the compressor(s) in a manner as necessary to meet load. A heating water reset curve shall be used.
- i. P-1 and P-2 shall be operated as redundant pumps when just the Apparatus section of the building will be heated by the AWHPs. P-1 shall be controlled to operate for one day to one week then shut down and P-2 shall be operate for the same period. When the other portions of the building served by the existing oil-fired hydronic boiler requires the AWHP system to contribute heating (i.e. if the air-to-air heat pump fails), both P-1 and P-2 shall be controllable to allow manual operation together to provide heat the remainder of the hydronic distribution by opening the new manual ball valves in the mechanical room.
- j. The controls shall be complete including but not limited to relays, HUH and FCU fan controls, sensors, wiring and interface devices. All controls, including thermostats and control valves shall be labeled with a white adhesive sticker with the equipment referenced that they associate with.
- k. The heating pumps shall be set for delta P operation depending on load from Apparatus and other sections of the building.
- l. Provide necessary start up, commissioning and testing of the controls to ensure each sequence operates properly.
- m. There will be accessory drain pans under the buffer tank, one under the glycol tank and one under the two redundant pumps and expansion tank.

END OF MECHANICAL TECHNICAL SPECIFICATIONS

7. Electrical Section

- a. Install all wiring in accordance with the prevailing issue of the current state of MA adopted version of the National Electric Code, together with any additional code rules in force by local inspection authorities. Obtain all necessary permits, certificates, etc. Present satisfactory proof of final inspection and approval by all inspection authorities before work is accepted.
- b. Consider the following industry standards as minimum requirements for all materials and equipment where such standards are established for materials in question:
 1. National Electrical Code, Current accepted Edition.
 2. National Fire Protection Association
 3. Institute of Electrical and Electronic Engineers.
- c. Thoroughly clean all electrical equipment, devices and enclosures upon completion of all work. Thoroughly clean and repair any equipment whose finish is damaged or rusted.
- d. The following panels, locations, number of spares and options for potential equipment to be powered are provided below for consideration.
- e. Guarantee the quality of all materials, equipment and workmanship furnished and installed for a period of one (1) year from the date of final acceptance of this installation by the owner and replace all defective apparatus, materials and equipment at your own expense.
- f. All work must be scheduled to allow the least interference with the normal operation of the existing facility must be approved in writing by the owner and may need to be done at other than normal working hours without additional compensation.
- g. Carefully remove and store on site where directed by the owner, all electrical equipment which is necessary to be removed. Remove and dispose of, off site in a legal manner, all of this equipment that the owner does not want. Prior to removing any electrical equipment, properly de-energize all associated wiring, remove wire from terminals of supply switches or circuit breakers, provide outlet boxes, knock out seals, cover plates, etc., to leave remaining installation in finished condition.
- h. Make any necessary re-circuiting, extensions of existing circuits, and relocations required to properly re-energize remaining existing devices or equipment that may be interfered with new construction or removals. Extend existing circuits to new location of items to be relocated.
- i. All materials and equipment to be installed to be new.
- j. Materials and equipment shall be suitable for their intended use and for the environment in which they are installed.
- k. Panels to be bolt on, thermal, magnetic, circuit breaker type as manufactured by Square D, General Electric, Cutler-Hammer and Siemens. Provide separate ground bus, door with tumbler lock, door-in-door trim (hinged trim) with piano hinges, typed panel directory, and 20 circuit breaker locks.
- l. Thoroughly bond and ground all metallic equipment including conduits, enclosures, etc., all in full conformance with the National Electric Code and local requirements.
- m. Do not use common neutrals for electrical wiring.

- n. Wiring shall be THW, THWN, XHHW, rated for 75 degrees C at a minimum and be suitable for wet and dry locations.
- o. Provide all required pull boxes, junction boxes and outlet boxes. Back to back outlets will not be permitted.
- p. Provide all disconnect switches with current limiting, time delay fuses. Except, provide dual element/time delay fuses for motors.
- q. Wiring for all electrical systems shall be color coded and all electrical equipment shall be labeled. Circuit breaker changes shall be clearly labeled at the panel. Thermostats shall be labeled with the AHU designation they are connected to.
- r. Install an outside rated service outlet adjacent to the new AWHPs to meet the code.
- s. Remove the existing strap-on aquastats from each of control loops for the existing four hydronic unit heaters in the Apparatus Room.
- t. Wire all new equipment shown on the Mechanical Equipment Schedule or otherwise noted in these specifications. Individual service switches for new equipment shall be mounted in locations which are accessible without the use of a ladder.

END OF ELECTRICAL TECHNICAL SPECIFICATIONS

8. General Requirements

- a. The selected Contractor will be required to provide (1) copy of submittals for the equipment to be installed to RISE Engineering for review and approval if an “or equal” model is proposed to be installed. This can be provided electronically.
- b. The installation will have a one year labor and materials warranty by the installing contractor. In addition, there may be longer manufacturer's materials warranties.
- c. Contractor Responsibility - The Contractor is responsible for successful completion of all phases of this project including but not limited to paying for and pulling all appropriate permits as required by law before commencement of work.
- d. The Contractor must use good workmanship in performing work as specified. Any deviations of the above work must be approved by RISE Engineering and the building owner.
- e. The workers shall leave the inside and outside of the building in a reasonably clean condition. Grounds shall be left in original condition except where otherwise approved by the building owner.
- f. Commencement of work shall begin immediately after the date of the award and contract signing with substantial completion by TBD, 2026 assuming the Notice to Proceed is issued on _____, 2026. Full completion shall be TBD, 2027.
- g. Contractor's price shall be good for a minimum of the installation period. The price will be provided consistent with the state of Massachusetts Prevailing Wage Requirements.
- h. Contractor shall maintain adequate levels of General Liability Insurance throughout the construction and commissioning process.
- i. The Contractor shall, at all times, fully protect his work and materials from injury loss by others. Any injury or loss which may occur shall be made without expense to the building owner. The Contractor shall be responsible for the proper protection of his materials and tools until the building is accepted by the Owner. The Contractor will be working in and adjacent to the resident's living space and has to be aware of resident's safety.
- j. The owner reserves the right to make any reasonable changes in location prior to installation at no expense to the owner. The Contractor shall verify conditions on site.
- k. The Contractor shall at all times have a foreman on the project authorized to make decisions and receive instructions exactly as if the contractor himself were present.
- l. It shall be understood that these documents are intended to perform as a guide and that omission of any specific item or failure to mention any local, state or federal requirements of law specifically shall not relieve the installing contractor firm from full and complete responsibility in furnishing a complete and satisfactory installation.
- m. The Contractor must furnish and install all materials as specified above. All bids must include all costs associated with the work to be done, including but not limited to overhead, profit, materials, permits, design (if any) and labor.
- n. The building owner has the right to reject any or all bids for the above work.
- o. Bids must be signed by an authorized representative of the company, signifying acceptance of the specifications.
- p. All bids shall be provided on form provided as itemized.

- q. The Contractor shall pay all fees, charges and permits, including but not limited to, those as required by the Commonwealth of Massachusetts and the Town of West Tisbury which may be required by the production, sale, transportation, delivery, use, and installation of the materials, sold hereunder.
- r. All Work shall be executed in accordance with the latest Building Codes, local inspection authorities and Occupational Safety and Health Administration (OSHA). It shall be understood that these documents are intended to perform as a guide and that omission of any specific item or failure to mention any local, state or federal requirements or authorities of law specifically shall not relieve the installing Contractor firm from full and complete responsibility in furnishing a complete, code compliant and satisfactory installation. Such requirements include or are based upon standards by, but are not limited to the following:
 - American National Standards Institute (ANSI)
 - American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standard 62.1-2019.
 - American Society of Testing Materials (ASTM)
 - American Standards Association (ASA)
 - Factory Mutual Association (FM)
 - National Board of Fire Underwriters (NBFU)
 - National Electric Code (NEC)
 - National Fire Protection Association (NFPA)
 - Massachusetts Building Code
 - Massachusetts Mechanical Code
 - Massachusetts Plumbing & Gas Codes
 - Town of West Tisbury, MA, Building Regulations and Ordinances.
- s. The work within the building on this project will be limited to between the weekday hours of 8AM until 6 PM.
- t. **Where the any of the specifications items conflict with the Local Code standards, the tougher standards will prevail.**
- u. The contractor is required to provide monthly invoicing on the standard AIA Requisition form showing the breakdown of the work by the following categories: Mobilization, Piping of the Distribution System, HVAC Equipment, Ductwork, Mechanical Insulation, Balancing, and Electrical power wiring.
- v. The contractor is required to meet the insurance requirements of the RISE Group.

9. Training and Manual Requirements

- a. Prior to final completion, but after substantial completion, the contractor shall provide all warranties and manuals to the Owner, along with a 24-hour emergency call number.
- b. Contractor shall provide operations & maintenance manuals for every piece of new equipment installed.
- c. Contractor shall develop and provide to the Owner a comprehensive maintenance schedule indicating the type of service and the periodic intervals at which the maintenance should occur.
- d. All Schedules, equipment manuals, and training materials shall be consolidated into three-ring or equivalent binders with a table of contents and labeled dividers to create comprehensive installed systems operations manual. Manuals shall have a title page inserted in the sleeve of the front of the binder and repeated inside. Manual binders should be sized to allow for the incorporation of new materials throughout the life of the building. Each manual shall also include all systems manufacturer's warranty documentation.
- e. Three (3) copies of the complete installed systems operations manual shall be provided to the Owner.
- f. The contractor shall provide training to the Owner's personnel to the satisfaction of the owner. The contractor shall, at minimum develop and provide one hour of training (coordinated with RISE Engineering) to the individuals specified by the owner. Training shall have written handouts, as well as hands-on demonstrations and verbal descriptions of the operation and maintenance requirements of the systems installed.

10. Warranty

- a. Contractor shall provide a 100% comprehensive warranty of the project for the first full year of operation for both parts and labor with a copy of said warranty included in each installed systems manual. In addition, contractor shall service and implement any manufacturer's warranties during this period.
- b. During the above warranty period, the Contractor or the Contractor's Subcontractor, shall be available via a 24-hour emergency call number to provide service and repairs 24 hours a day, 7 days a week. The contractor shall provide emergency response within one day.
- c. Contractor shall provide an optional annual cost proposal for on-going service, maintenance and 24/7 emergency repair response to commence in the second year, upon expiration of the first year's warranty.