

## WATER HEATER AND FURNACE REPLACEMENT

October 17, 2022

### PROJECT REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 SCOPE OF WORK

- A. The general scope of work for this project shall include:
  - a. 14-0 -bedroom units are to be renovated.
  - b. Provide per unit price.
  - c. Remove and properly dispose of existing electric water heater, HVAC equipment, controls, piping and air distribution. Cap unused gas piping. Existing duct may be abandoned in place.
  - d. Existing grille openings in ceiling shall be patched and painted to match existing.
  - e. Provide and install new, tankless, electric water heater in existing mechanical space, providing all necessary wiring and other related materials.
  - f. Provide and install new, ground mounted heat pump and interior wall mounted units with hard-wired, wall mounted controls. New wiring shall be concealed.
  - g. Provide new wiring, disconnect and breaker as required.
  - h. Install new intake and relief PVC vent to new concentric intake at roof. Provide weatherproof penetration.
  - i. Reconnect new water heater to existing water piping in mechanical space.
  - j. Route new condensate piping from factory condensate pump to new french drain at exterior

##### 1.02 REGULATORY REQUIREMENTS

- A. All work shall be executed and inspected in accordance with all local and state codes, laws, ordinances, rules and regulations applicable to the particular class of work. The Contractor shall include in his quotation all applicable service charges, fees, permits, royalties, and other similar costs in connection with the work. If, to the knowledge of the Contractor, the drawings and specifications conflict with the above, he shall promptly notify the engineer in writing so that necessary changes can be provided for in his contract. If the contractor performs any work without notice as required, he shall bear all the costs of corrective action.
- B. The Contractor shall obtain permits, and request inspections from authority having jurisdiction.

##### 1.03 SUBMITTALS

- A. Install work in locations as indicated in specification, unless prevented by Project conditions. The Contractor shall make use of all data in all the contract documents and shall verify all information at the site prior to start of construction.

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- B. The Contractor shall verify the exact location of each unit as necessary and existing conditions.
- C. The Contractor shall provide a submittal to the owner for approval prior to the procurement for:
  - 1. Electric Water Heater
  - 2. 2-ton Heat pump/AHU – Mitsubishi NTXMPH24A132 heat pump and three NTXWST09A112 air handlers
  - 3. 1.5-ton Heat pump/AHU - Mitsubishi NTXMPH20A122 heat pump and two NTXWST12A112 air handlers
  - 4. Or equivalent as noted below.

**1.04 GUARANTEE**

- A. Contractor shall guarantee all work performed under this contract to be free from defects in materials and workmanship for a period of one year from date of witnessed and approved startup.
- B. Refer to individual specification sections and drawings for additional guarantees and equipment warranty requirements.

**PART 2 PRODUCTS**

**2.01 MOTORS**

- A. Motors for all Division 15 equipment shall be furnished by suppliers of such equipment and shall be the type that has characteristics suitable for continuous operating conditions. Motors shall consist of NEMA frame construction, 40 degrees C temperature rise, suitable for the available electric current characteristics, and have quiet operating bearings.

**2.02 TEMPERATURE CONTROL WIRING**

- A. All temperature control wiring shall be furnished and installed by this division in accordance with all local codes and ordinances. All installations shall be in accordance with manufactures recommendations for connected devices. All temperature control wiring shall be in conduit when exposed.

**2.03 TRANSPORTATION AND HANDLING**

- A. Transport and handle Products in accordance with manufacture instructions.
- B. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.
- C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

**2.04 STORAGE AND PROTECTION**

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- A. Store and protect Products in accordance with manufacturers' instructions, with seals and labels intact and legible.
- B. Store sensitive Products in weather tight, climate-controlled enclosures.
- C. For exterior storage of fabricated Products, place on sloped supports, above ground.
- D. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of Product.

**2.05 PRODUCT OPTIONS**

- A. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit request for substitution for any manufacturer not named.

**2.06 SUBSTITUTIONS**

- A. Product may be substituted in place of specified products as long as the substituted product meets or exceeds the specified product basis and is approved by the owner.

**PART 3 EXECUTION**

**3.01 EQUIPMENT REPLACEMENT**

- A. All work performed by this section shall utilize craftsman with a demonstrated ability to perform the specific work required.
- B. All work performed by this section shall be by a contractor licensed in the State of Kentucky for this class of work.
- C. All work shall be coordinated with owner. Construction activities shall not begin, and existing units shall not be disabled without owner's approval. Contractor shall, generally, only disable the existing units at the time that the replacement equipment is ready to install.
- D. Existing electrical at equipment shall be disconnected and wiring extended to new equipment locations. Contractor shall verify capacity of existing electrical service prior to installation and remove any unused breakers. Natural gas piping and control wiring shall be disconnected and extended to new water heater/thermostat location. Provide drip leg and accessible shutoff valve in mechanical room.
- E. Remove existing equipment, unused combustion air ducts and unused flue piping. Cap unused flues through roof. Cap any unused water piping.
- F. Install new water heater in mechanical closet. Maintain manufacturers recommended clearances.
- G. Connect to existing water piping.



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- H. Install new heat pump on new concrete pad outdoors at current outside unit location. Preformed pads are not allowed. Install new AHU in living area and each bedroom as high as possible. Provide and install new, non-programmable, hard-wired thermostat.
- I. Route discharge from factory condensate pump to new french drain outdoors at a location so as not to be a nuisance.
- J. Contractor shall install new intake and relief PVC flue piping from new water heater through roof to concentric intake.
- K. Existing refrigerant piping may be reused if in acceptable condition. Contractor shall inspect prior to construction and replace as required. Reinsulate all refrigerant piping as required.

**3.02 CAPACITIES**

- A. Provide a per unit price to replace existing equipment

**END OF SECTION**

**DOMESTIC WATER HEATERS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Water heaters.
  - 2. Accessories.

**1.02 REFERENCES**

- A. American National Standards Institute (ANSI) Publications:
  - 1. Z21.22 "Relief Valves for Hot Water Supply Systems"
- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Publications:
  - 1. 90.1 "Energy Code for Commercial and High-Rise Residential Buildings"
  - 2. 90.2 "Energy Code for New Low-Rise Residential Buildings"
- C. The American Society of Mechanical Engineers (ASME) Publications:
  - 1. "(The 2004) ASME Boiler and Pressure Vessel Code"
  - 2. B1.20.1 "Pipe Threads, General Purpose, Inch"
  - 3. B16.5 "Pipe Flanges and Flanged Fittings: NPS 1/2 through 24"
  - 4. B16.24 "Cast Copper Alloy Pipe Flanges and Flanged Fittings: Classes 150, 300, 400, 600, 900, 1500 and 2500"
- D. American Society of Sanitary Engineering (ASSE) Publications:
  - 1. 1017 "Performance Requirements for Temperature Actuated Mixing Valves for Hot Water Distribution Systems"
- E. Canadian Standards Association (CSA) Publications:

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1. B125.1 "Plumbing Supply Fittings"
- F. National Fire Protection Association (NFPA) Publications:
  1. 70 "National Electric Code"
- G. Underwriter's Laboratories, Inc. (UL) Publications:
  1. 486A "Standard For Wire Connectors and Soldering Lugs for Use With Copper Conductors"
  2. 486B "Standard for Wire Connectors for Use with Aluminum Conductors"
  3. 778 "Standard for Motor-Operated Water Pumps"
  4. 795 "Standard for Commercial-Industrial Gas Heating Equipment"

**1.03 SUBMITTALS**

- A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.
- B. Submit "Letter of Conformance" indicating specified items selected for use in project with the following supporting data.
  1. Product Data:
    - a. For each type and size of water heater, include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.
    - b. Wiring Diagrams: Power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring.
  2. Product Certificates: Signed by manufacturers of water heaters certifying that products furnished comply with requirements.
  3. Maintenance Data: For water heaters to include in maintenance manuals specified in Division 01.
  4. Warranties: Special warranties specified in this Section.

**1.04 QUALITY ASSURANCE**

- A. Source Limitations: Obtain same type of water heaters through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of water heaters and are based on specific units indicated.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. ASME Compliance: Fabricate and label water heater, hot-water storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 01.
- E. ASHRAE Standards: Comply with performance efficiencies prescribed for the following:
  1. ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings," for commercial water heaters.

**1.05 WARRANTY**

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of water heaters that fail in materials or workmanship within specified warranty

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period.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Approved Manufacturers
  - 1. Electric Water Heaters: (Tankless Type)

#### 2.02 WATER HEATER ACCESSORIES

- A. Water Heater Stands: not used
- B. Water Heater Mounting Brackets: Water heater manufacturer's factory-fabricated steel bracket for wall mounting and capable of supporting water heater and water.
- C. Drain Pans: not used
- D. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2.

### PART 3 - EXECUTION

#### 3.01 WATER HEATER INSTALLATION

- A. Install commercial water heaters on concrete bases.
  - 1. Exception: Omit concrete bases for water heaters if installation on stand, bracket, suspended platform, or direct on floor is indicated.
- B. Install water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
- C. Install combination temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend relief valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- D. Install water heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 22 Section "Domestic Water Piping Specialties" for hose-end drain valves.
- E. Install thermometer on outlet piping of water heaters.
- F. Install piping-type heat traps on inlet and outlet piping of water heater storage tanks without integral or fitting-type heat traps.
- G. Fill water heaters with water.

#### 3.02 CONNECTIONS

- A. Install piping adjacent to water heaters to allow service and maintenance. Arrange piping for easy removal of water heaters.
- B. Ground equipment according to NEC 2017
- C. Connect wiring according to NEC 2017



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**3.03 FIELD QUALITY CONTROL**

- A. Perform the following field tests and inspections:
  - 1. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
  - 2. Operational Test: After electrical circuitry has been energized, confirm proper operation.
  - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Remove and replace water heaters that do not pass tests and inspections and retest as specified above.

**3.04 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain commercial electric water heaters.

**END OF SECTION**

**MINI-SPLIT AIR CONDITIONER**

**PART 1 – GENERAL**

**1.1 SUMMARY**

- A. This Section includes split system air conditioning and heat pump units consisting of separate evaporator fan and compressor condenser components. Units are designed for exposed or concealed mounting.

**1.2 SUBMITTALS**

- A. Product Data: For each unit indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Operation and maintenance data.

**1.3 QUALITY ASSURANCE**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- C. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- D. Units shall be designed to operate with HCFC-free refrigerants.

**1.4 WARRANTY**

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- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace split system air conditioning units that fail in materials and workmanship within five years from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
  - 1. Mitsubishi
  - 2. LG
  - 3. Carrier
  - 4. Bosch

#### **2.2 EVAPORATOR FAN UNIT**

- A. Cabinet shall be constructed of a durable material with a galvanized steel sub-chassis. Unit shall be fully insulated for improved thermal and acoustic performance.
- B. Unit cabinet discharge and inlet grilles shall be constructed of high-impact plastic.
- C. Fans shall be direct drive blower type with air intake and discharge on the unit. Automatic, motor driven air sweep shall be provided.
- D. Horizontal and/or vertical discharge louvers shall be adjustable.
- E. Coils shall be copper tube with aluminum fins and galvanized steel tube sheets. Fins shall be bonded to the tubes by mechanical expansion and specially coated for enhanced wettability. A drip pan under the coil shall have drain connections for hose attachment, on either the left or right hand side, to remove condensate. Condensate pan shall be corrosion resistant.
- F. Motors shall have permanently lubricated ball bearing with inherent overload protection. Fan motors shall a minimum of 3 speeds.
- G. Unit shall have filter track with factory supplied mildew proof cleanable filters.
- H. Minimum performance shall be 16.0 SEER and 10.0 HSPF for units.

#### **2.3 AIR-COOLED, COMPRESSOR CONDENSER UNIT**

- A. Casing steel, finished with baked enamel, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
- B. Compressor: Hermetically sealed with crankcase heater. Compressor motor shall have thermal and current sensitive overload devices, start capacitor, relay, and contactor.
- C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
- D. Heat Pump Components: Reversing valve and low temperature air cut-off thermostat.
- E. Fan: Aluminum, propeller type, directly connected to motor.
- F. Motor: Permanently lubricated, with integral thermal overload protection.
- G. Low Ambient Kit: Permits heating operation down to 0 deg F.
- H. Mounting Base: Polyethylene.

#### **2.4 ACCESSORIES**



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- A. Thermostat: Low voltage with subbase to control compressor and evaporator fan.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install evaporator fan components using manufacturer's standard mounting devices securely fastened to building structure.
- B. Install ground mounted, compressor condenser units on concrete base using elastomeric mounts. Secure units to anchor bolts installed in concrete bases. Concrete base is specified in Division 23 Section "Common Work Results for Mechanical" and concrete materials and installation requirements are specified in Division 03 Section "Cast-in-Place Concrete." Comply with requirements for vibration isolation devices specified in Division 23 Section

**3.2 CONNECTIONS**

- A. Install piping adjacent to unit to allow service and maintenance.

**3.3 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Engage a factory authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
- C. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new components, and retest.
- D. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

**END OF SECTION**