PART 1 - GENERAL

1.1 GENERAL

- A. Architect's General Conditions are a part of this Division. All work shall be done in strict accordance with all applicable Codes and Regulations of local and State Agencies and utility companies. This Contractor shall bear the cost of all fees, permits, licenses and taxes and any utility company charges in connection with the work. All equipment installed shall be UL listed.
- B. AIA Document A201-2007 "General Conditions of the Contract for Construction" is hereby made part of these Specifications.

1.2 SCOPE

- A. Provide a complete HVAC system and all other equipment as shown on the Drawings and herein specified, including but not limited to:
- System shall be complete in all respects, tested, accepted and ready to operate.

1.3 SUBMITTALS

- A. Submit PDF copies of manufacturer's drawings of the following to the Architect for approval:
- 1. Submit information on any equipment show in mechanical schedules, details and specifications.
- 2. Submit information on any other equipment to be used when requested by the Architect or the Engineer. 3. Submit six PDF copies of ductwork shop drawings showing clearances with structural members and major equipment of other trades.

1.4 GUARANTEE

- A. Materials, equipment and workmanship shall have standard warranty against defects in material and workmanship. Any failure due to defective or improper material, equipment, workmanship or design shall be made good, forthwith, by and at the expense of the Contractor, including any damage done to areas, materials and other systems resulting from this failure. Guarantee period shall extend for one year from the Date of
- B. The HVAC Contractor shall provide a guarantee covering all material and workmanship for 1 year following the Date of Acceptance.

1.5 DEFINITION

- A. As used on Contract Documents, the term "to provide" shall mean "to furnish, install and connect completely in the specified or approved manner the item or material described."
- 1.6 OPERATING AND MAINTENANCE INSTRUCTIONS
- A. Upon completion of the project, the HVAC Contractor shall fully instruct the Owner in the operation, adjustment and maintenance of all equipment and systems furnished.
- B. The HVAC Contractor shall provide the Owner with three (3) sets of complete maintenance and operating instructions, and technical data, in booklet form, of all equipment and devices furnished in the Contract.

1.7 CONTRACTOR'S INSPECTION

- A. Contract Drawings are diagrammatic and do NOT show every required fittings, etc. The Contractor shall familiarize himself with the existing site conditions, prior to submitting a bid, and shall include all equipment and accessories necessary for complete and operational systems.
- B. The HVAC Contractor shall examine the Architectural Drawings and the drawings and specifications of other trades to determine the extent of work. The HVAC Contractor shall visit the site and become familiar with the project and local conditions before submitting a Bid. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. If so directed by the Architect or Engineer, the HVAC Contractor shall, without extra charge, make reasonable modifications in the layout to prevent conflict with those of other trades and for proper installation of work. Refer to the Architect's Reflected Ceiling Plan for exact location of air diffusers, registers and grilles. The Contractor shall coordinate locations of equipment with all trades before starting construction. Any modifications to the equipment layout required for installation shall be performed at no additional cost to the Owner.

1.8 ARRANGEMENT OF WORK

A. Work shall be coordinated between trades to prevent unnecessary interference. Work shall present a neat coordinated appearance. Install work as necessary to provide maximum possible headroom, adequate clearance and ready access for inspection, operation, safe maintenance and repair. and Code conformance Where space appears inadequate, consult the Owner before proceeding with installation.

1.9 INSURANCE

- A. Furnish insurance certificates required by the Owner.
- 1.10 PERMITS, LAWS, ORDINANCES, CODES AND STANDARDS
- A. Obtain and pay for permits, inspections, licenses and certificates required. Work of this Contract shall meet current accepted editions of the State Building Code, State Fire Safety Code and other laws, rules and regulations of local, State and Federal authorities including, but not limited to: National Fire Protection Association #13; National Fire Protection Association #90A; National Fire Protection Association #90B; National Fire Protection Association #99; International Plumbing Code; International Mechanical Code; National Fire Protection Association #70 (National Electrical Code); and local utility company requirements. Pay utility company backcharges. Equipment, materials and components listed UL Product Directories, shall

1.11 FILTERS AND STRAINERS

A. Any equipment which operates with filters or strainers shall have filters and strainers installed at all times.

1.12 WORK BY OTHERS

A. The HVAC Contractor shall install all motors provided under the HVAC Contract ready for wiring by the Electrical Contractor and shall furnish and deliver to the Electrical Contractor wiring diagrams for all motor starters for installation and wiring. The HVAC Contractor shall furnish motor starters, relays and all temperature control equipment to the Electrical Contractor for installation and wiring. The General Contractor shall perform all excavation, backfill, chases, openings, cutting, patching and finish work.

1.13 FIELD MEASUREMENTS

- A. The HVAC Contractor shall verify in the field all measurements necessary for the work. Verify thermostat locations with the Owner before installation.
- B. The HVAC Contractor shall coordinate supply and return ductwork locations with structure, conduits and piping of other trades.

1.14 WORKMANSHIP

- A. Equipment and materials shall be new, of first quality, selected and arranged to fit properly into spaces indicated. Install equipment and materials in accordance with manufacturer's recommendations.
- 1.15 COORDINATION WITH OWNER
- A. All work shall be scheduled with the Owner. Interruptions in the Owner's access to the site shall be subject to Owner limitations of date and duration.

1.16 OPERATION OF SERVICES AND UTILITIES

A. Shutdown of existing services and utilities shall, without exception, be coordinated with the proper utility and with the Owner as to date, time of day, and duration before any service is interrupted. Notify the Owner of estimated duration of shutdown period at least ten days in advance of proposed shutdown.

1.17 PROTECTION

- A. Close open ends of work with temporary covers or plugs during construction to prevent entry of obstructing material or damaging water. Protect existing property, equipment and finishes from damage. Repair, to original condition, existing property that has been damaged during execution of the work.
- 1.18 CLEANING A. Work site must be kept clean. Rubbish, debris and leftover or excess materials shall be removed daily.
- 1.19 LUBRICATION

A. No equipment shall be operated for temporary service or testing without proper lubrication. Items requiring

lubrication shall be left freshly and fully lubricated at time of substantial completion. Furnish Owner with one

(1) complete new set of any special lubrication devices required for servicing, e.g., grease guns, fittings and 1.20 PAINTING A. Mechanical and electrical equipment and materials shall have prime coat and standard manufacturer's finish.

Painting of finished surfaces (excluding ceilings) shall be one coat primer and two coats vinyl base semi-gloss

paint. Painting of ceiling shall be one coat primer and two coats flat white paint. Primer shall be omitted on repainting of existing surfaces.

surfaces shall be to nearest cut-off point.

1.21 CUTTING AND PATCHING A. Areas disturbed by new construction or demolition shall be patched and repaired to match existing conditions. Patch painting of ceilings shall include painting of entire ceiling of room involved. Patch painting of other

1.22 WATERPROOFING

A. Provide necessary sleeves, caulking and flashing required to make openings waterproof.

1.23 FIREPROOFING

- A. At closing of each working day, provide temporary firestopping in every opening cut between floors and through fire-rated partitions. Permanent firestops shall be provided around sleeves and at other permanent openings through fire-rated partitions and floors, as required. Materials used for fire stopping shall be Class A
- "Noncombustible" with firestopping capabilities equal to that of adjacent construction. 1.24 BASES AND SUPPORTS
- A. Provide necessary supports, pads, bases and piers required. Equipment shall be securely attached to building structure in acceptable manner. Attachments shall be of strong and durable nature, as determined by the

A. Provide adequately sized access doors, for access to concealed equipment and components requiring

1.25 ACCESS

servicing or inspection. Doors shall have fire ratings equal to construction in which they are located.

A. Perform tests required by the Owner, legal authorities and agencies. Each piece of equipment, including

motors and controls, shall be operated continuously for minimum one-hour test. Correct all defects appearing during tests, and repeat tests until no defects are disclosed. Final tests shall be made in the Owner's presence.

1.27 SEISMIC REQUIREMENTS A. Submit six (6) copies of a final inspection report which includes: Sealed certification by a Structural Engineer

with P.E. registration in the state in which the project is located.

- Engineer has reviewed the project. 2. Engineer has approved the use of the devices for the particular applications.
- 3. The devices satisfy Specification and Code mandated seismic criteria.
- B. Application of Seismic Restraint Requirements is governed by the 2005 State of Connecticut Building Code
- with reference to A.S.C.E. 7-05, Section 9.6. Refer to Architects code sheet for the seismic design category C. Seismic restraint for all trades shall be provided as required, based on the building seismic design category
- and material importance factors. Refer to individual trade sections for additional requirements.

limited to, following:

- 1.28 INSTRUCTION TRAINING A. Competent technicians shall provide instruction to Owner's personnel. Instructions shall include, but are NOT
- 1. Familiarization with HVAC Control System, hardware and operation procedures.
- Familiarization with Management System Hardware.
- Use of management system.

Trouble-shooting and service procedures.

4. Modifications of software packages.

PART 2 - PRODUCTS

2.1 MATERIALS AND METHODS

- 1. Chilled water piping 2-1/2 inches and larger shall be Schedule 40 black steel with welded or flanged fittings. Piping two (2") inches and smaller shall be Schedule 40 black steel with Class 125 cast iron
- 2. Cooling coil condensate drain piping shall be Type "M" copper with wrought copper pressure fittings and 95/5 solder. Use 45 degree lateral type fittings and long sweep elbows. No tees or short radius elbows
- 3. Water system piping shall be run level. Take-offs shall be made from the bottom of the main or at 45 degrees from the bottom of the main. Provide drain valves at all low points; manual air vents at all high
- points. Use eccentric reducers on horizontal lines, flush to top of the pipe. 4. Provide unions and shut-off valves at all equipment, coils, etc.
- 5. All piping shall be supported in a manner to prevent vibration or sagging. In no case shall the hanger spacing exceed the distances listed in the current accepted edition of the International Mechanical Code.

- 1. Gate (2-1/2" and smaller): Nibco #T-111, Stockham #100.
- 2. Gate (3" and larger): Nibco #F-617-0, Stockham #G-623.
- 3. Globe: Nibco #T-235, Stockham #B-22. 4. Check (for base-mounted pump discharge): Milwaukee #1400, Nibco #W-960, Stockham #WG-970.
- 5. Check (2" and smaller): Nibco #T-433-Y, Hammond #IB946.
- 6. Check (2-1/2" and larger): Nibco #F91 8, Hammond #IR1124.
- Bail Valves: Apollo #70-100, Jamesbury #A11TT
- 8. Butterfly: Stockham #LD-711, Keystone #AR-2. 9. Balancing: Armstrong CBV or Bell & Gossett "Circuit Setter".
- 10. Hose Bibb Drain: Nibco #74, Central Brass #548
- C. Ductwork: 1. All ductwork and accessories shall be constructed, fabricated and installed in accordance with the latest
 - SMACNA Standards manuals for low pressure ducts, fire damper installations and flexible ductwork. 2. Air conditioning secondary supply ductwork to air outlets shall be galvanized steel with one (1") inch
- acoustical duct liner. One (1") inch static pressure classification, Seal Class "C". 3. Flexible ducts on primary side of system shall be semi-rigid metallic mechanically locked spiral duct, UL
- Class 1 air duct, Flexmaster Type V BuckDuct. Provide pre-insulated or field insulate as required. 4. Flexible ducts to air outlets shall be UL Class 1 connectors with airtight core, galvanized wire helix and pre-insulated with one (1") inch, 3/4 pcf fiberglass with a flame retardant vapor barrier. Flexmaster Type
- 5. All air conditioning, supply and exhaust (except kitchen exhaust), outside air and ventilation systems ductwork shall be galvanized sheet metal, two (2") inch static pressure classification, Seal Class "C". Return air ductwork to be one (1") inch classification.
- 6. Provide airtight, gasketed access panels for cleaning at all changes in direction and at the base of all risers and every 20 feet in horizontal runs. 7. Bottom of access panels shall be at least 1-1/2" above the bottom of the duct. Ascertain that all access
- panels are indeed in accessible locations. 8. Install adequate balancing; e.g., volume dampers, extractors, etc., as required to balance each system to
- its design airflows. 9. Furnish and install UL listed fire dampers and access doors at all duct penetrations of walls, floors, partitions, etc., that are required to have a fire resistance rating. Fire dampers, sleeves, access doors, etc., shall be constructed and installed in conformance to the manufacturer's instructions, NFPA 90A and the Building Official.
- 2. Duct System Insulation: a. Concealed air conditioning supply duct systems shall be insulated with 1-1/2" thick fiberglass duct wrap with continuous vapor barrier.
- b. Insulate exposed air conditioning supply air ductwork and all insulated air ducts in mechanical rooms with 1-1/2" thick, rigid foil-faced fiberglass duct insulation.

c. Acoustical lining, where shown, shall be nominal 1" thick fiberglass duct liner, unless otherwise

2.2 AUTOMATIC TEMPERATURE CONTROLS

1. See PART 3 - HVAC INSTRUMENTATION AND CONTROLS for products and sequence of operations relating the automatic temperature controls.

PART 3 - HVAC INSTRUMENTATION AND CONTROLS

3.1 SCOPE

A. Provide labor, materials, services, equipment and transportation necessary for extension of existing controls, as indicated on Contract Drawings and specified herein, including, but NOT limited to, the following:

Control of existing water source heat pumps

2. Control of new cabinet exhaust fan serving new Smart Closet

3.2 THERMOSTATS (ADD/ALTERNATE):

- 1. Provide new programmable thermostats for existing water source heat pumps in lieu of relocating existing
- 2. Thermostat shall be 1 stage cooling/1 stage heating with auto changeover from cooling to heating.
- Provide thermostat with 7 day programming and nighttime/unnoccupied setback modes.

A. Space thermostat controlling existing water source heat pumps shall operate heat pump compressor and fan

- Thermostat shall be compatible with existing Trane water source heat pumps.

Manufacturer shall be Honeywell or approved equal.

- 3.3 SEQUENCE OF OPERATION: EXISTING WATER SOURCE HEAT PUMPS
- as required to maintain space temperature setpoint. B. Room space temperature setpoint shall be 74°F (adjustable).
- 3.4 SEQUENCE OF OPERATION: SMART CLOSET EXHAUST FAN
- A. Reverse acting thermostat shall start and fan when room temperature reaches 85°F.
- B. Fan shall de-energize when room temperature reaches 78°F (adjustable).
- 3.5 INSTALLATION OF EQUIPMENT, SENSORS AND VALVES
- A. Thermostats shall be mounted 6 feet above finished floors in corridors or stairs; elsewhere, they shall be mounted 66 inches above finished floors. Exact locations shall be coordinated with adjacent light switches and other wall-mounted devices. Space temperature sensor shall be mounted adjacent to thermostat.

PART 4 - EXECUTION

4.1 FIRE STOPS

A. All penetrations through fire rated walls, ceilings or floors in which pipes or ducts pass shall be sealed with a UL approved fire-stop fitting classified for an hourly rating equal to the rating of the wall, ceiling or floor.

4.2 REMOVAL, RELOCATION AND/OR ABANDONMENT

A. Certain items of existing equipment and piping or ductwork may be indicated for removal, relocation or abandonment. Items noted for removal shall be disconnected and turned over to the Owner or disposed of by the Contractor if the Owner so requests. Items noted for relocation are intended for reuse in another location as designated on the Drawings. It shall be the responsibility of the Contractor to remove the material from its present location, store the material in a safe place and reinstall the material in its new location. Questions regarding the suitability of the material or equipment shall be brought to the attention of the Architect/Engineer in writing. Abandonment shall be defined as abandoning in place any item so designated and shall include proper piping or ductwork termination within any occupied or open area. All abandoned pipes and ducts shall be disconnected and capped at their mains. All abandoned pipes shall be capped.

- 4.3 BALANCING AIR AND WATER SYSTEMS
- A. This contract is for all labor, materials and equipment required for the air and water systems.
- B. Air systems to be balanced include air conditioning, make-up and exhaust systems. Balancing shall include rebalancing (adjusting of sheaves and replacing belts and motors as indicated) of exhaust fans, rooftop air conditioning units and make-up air units as required to provide air flows specified. The Balancing Contractor
- shall secure a set of as-built ductwork plans prior to commencing work C. The Balancing Contractor shall attend a coordination meeting with the HVAC and ATCS Contractors to
- coordinate sensor locations. D. Upon completion of all tests and balancing operations, the Contractor shall submit five (5) copies of the certified Balancing Report to the General Contractor. This report shall include all data for each of the air and
- E. Balancing of systems shall be followed up after building is occupied; any rebalancing shall be done as required to meet occupant's requirements without extra charge.

4.4 START UP AND ADJUSTMENT

- A. Startup of equipment shall be performed according to manufacturer's recommendations. Startup and adjustment shall include services required to check out, test and balance devices to ensure proper sequencing of operation, prior to instruction of the Owner's maintenance personnel.
- B. Prior to startup, equipment shall be checked for physical damage, loose connections, loose parts, leaks and other defects and defects shall be corrected.

END OF SECTION

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Revisions \searrow Owner's Review Comments/ Issue for Bid 5/26/16