DIVISION 02 - EXISTING CONDITIONS

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. The work covered under this section consists of the furnishing of all necessary labor, supervision, materials, equipment, and services to completely execute the mechanical demolition as described in this specification and as shown and noted on the drawings.

B. The demolition documents plans and specification have been prepared from existing non-as built documents and cursory non-invasive field investigation.

C. It is the contractors' obligation to become familiar with the extent of demolition and the existing conditions before submitting their bid.

D. The contractor shall become familiar with the drawings and scope of work of other trades as the work scope of those trades relates to mechanical equipment and connection requirements.

E. During demolition if the contractor discovers unforeseen significant non code compliance conditions of the existing installation they shall notify the Engineer immediately in writing.

F. During demolition the contractor shall record on site maintained as-builts of all hydronic system piping capped branches, plumbing sanitary, waste and domestic hot, cold and hot water recirculation capped branches, and capped supply air, return air and exhaust air ducts for reuse in renovated project space.

PART 2 PRODUCTS

2.1 MATERIALS

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that piping and ductwork to be demolished serve only equipment and facilities within the demolition areas of the second floor.

B. Report discrepancies to Owner before disturbing existing installation.

C. Prior to the submission of a Request for Information (RFI) the contractor shall exhaust all efforts to remedy the situation in the field with the assistance of the construction manager (CM). The resolution shall be consistent with the means and methods described within both the drawings and specifications which constitute this contract. If review with the CM does not result in a resolution, it is then acceptable to submit a formal RFI to the Owner.

D. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

A. Identify locations for capping piping and ductwork before any demolition work commences.

B. Confirm isolation valve locations for domestic water piping and hydronic piping. Repair leaking isolation valves or replace inoperable valves before commencing piping demolition.

C. Cap and seal air-tight supply, return and exhaust air ductwork at shaft walls before commencing sheet metal demolition.

3.3 DEMOLITION OF EXISTING MECHANICAL WORK

A. Remove, relocate and extend existing mechanical piping or sheet metal work to accommodate new construction.

B. Remove sanitary and waste piping to branch connection fitting to negate any dead ends.

C. Remove domestic water piping back to isolation valve.

D. Remove hydronic water piping back to isolation valve.

E. Remove all supply, return and exhaust air ductwork back to main connection.

3.4 CLEANING

A. Clean and repair existing materials and equipment that remain or that are to be reused.

END OF SECTION 024119

DIVISION 22 - MECHANICAL

SECTION 220500 - BASIC MECHANICALREQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 APPLICATION

A. The mechanical contractor is responsible for the installation and operation of the plumbing, hvac systems, and temperature control systems.

B. Contractor and subcontractors shall review all sections of the specifications in addition to the particular section covering their specific trade.

1.3 DRAWINGS

A. The drawings are diagrammatic and show general location and arrangement of equipment and routing of piping.

B. All dimensions indicated on drawings shall be field verified to determine actual locations, distances, and levels.

C. If during field verification, the contractor identifies that there may require substantial changes from the original plans, the contractor shall notify the Owner for agreement on necessary adjustment before the installation is started

D. Discrepancies shown between plans, or between plans and actual field conditions, or between plans and specifications shall promptly be brought to the attention of the engineer for a decision.

E. Drawings and specifications are intended to cover the completed installation of systems to function as described. The omission of the expressed reference to any item of labor and material necessary to comply with practice codes, ordinances, etc., shall not relieve the contractor from providing such additional labor and material at no cost to Owner.

F. The drawings show the location and general arrangement of equipment, piping and related items. They shall be followed as closely as elements of the construction will permit.

G. Review the drawings of other trades and verify the conditions governing the work on the job site.

H. Deviations from the drawings due to field conditions, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Owner.

1.4 PERMITS

A. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for mechanical work shall be secured and paid for by the contractor. All work shall conform to all applicable codes, rules and regulations.

1.5 CODES

A. All work shall be executed in accordance with the rules and regulations set forth in local and state codes. Contractor shall prepare any detailed drawings or diagrams, which may be required by the governing authorities. Where the drawings and/or specifications indicate materials for construction in excess of code requirements, the drawings and/or specifications shall govern.

1.6 MAINTENANCE

A. Contractor shall provide four (4) hours of instruction to the owner's designated personnel in the maintenance and operation of equipment and systems installed under this project.

B. Provide complete maintenance and operating instructional manuals covering all mechanical equipment herein specified, together with parts lists.

C. Four (4) copies of all literature shall be furnished for owner and shall be bound in book or ring binder form.

1.7 WARRANTY AND GUARANTEE

A. Contractor shall guarantee all work installed by him or his subcontractors to be free from defect in material and workmanship for a period of one year from date of final acceptance of the work, unless a longer period is stipulated under specific headings. Contractor shall repair or replace at no additional cost to the owner, any material or equipment developing defects and shall also make good any damage caused by such defects or the correction of defects. Repairs or replacements shall bear additional guarantee, as originally called for, and dated from the final acceptance of the repair or replacement. This requirement shall be binding even though it will exceed product guarantees normally furnished by some manufacturers. Contractor shall submit his own and each equipment manufacturers written certificates, warranting that each item of equipment furnished complies with all requirements of the drawings and specifications. Note that guarantee shall run from date of final acceptance of the work, not from date of installation of a device or piece of equipment.

1.8 SUBMITTALS

A. Required submittals:

1. Shop Drawings
2. Product Data Sheets
3. Manufacturer's Instructions
4. Maintenance Data
5. Warranty

B. Installation of any item that requires submittal approval by the engineer shall be installed at the contractors' risk. The contractor, at his cost, shall remove all work installed prior to approval of the submittal.

C. For underground piping, contractor shall record dimensions and invert elevations of all piping, including all offsets, fittings, catholic protection and accessories. Locate dimensions from benchmarks that will be preserved after construction is complete.

D. Product data cut sheets shall be submitted on the following material and equipment:

1. Geothermal heat pump
2. Temperature controls
3. Pump (or Flow Center)
4. HVAC piping
5. HVAC pipe insulation
6. Hydronic accessories

1.9 RECORD DRAWINGS

A. Record drawings shall be maintained by the contractor up to date as the project progresses.

B. Recording all deviations from the contract documents, indicate exact locations of all buried services both inside and outside of the building; include concealed piping and equipment in the entire contract. Final record drawings shall reflect the as-built conditions.

1.10QUALITY ASSURANCE

A. Other referenced standards:

1. Comply with referenced standards, guidelines, data sheets from various associations, including NFPA, ANSI, ASTM, ASME, ASHRAE

PART 2 PRODUCTS

2.1 FILTERS

A. Provide and maintain “construction” air filters in the heat pump unit throughout the construction period. Immediately prior to final building acceptance by the owner, contractor shall replace all “construction” air filters with new.

2.2 SLEEVES

A. Provide sleeves wherever pipes pass through exterior wall, and floors. Sleeves shall be schedule 40 steel pipe cut to length and terminate flush with walls, partitions and ceilings in finished areas. All sleeves through floor shall extend 2" above floor. Provide escutcheon plates with positive catches on each visible sleeve penetration. Sleeves are to be sealed at each installation with approved sealant.

2.3 DIELECTRIC UNIONS

A. Dielectric unions shall be used to connect dissimilar metals (such as steel and copper) to prevent electrolytic action.

2.4 BUILDING ATTACHMENTS FOR MECHANICAL WORK SUPPORTS

A. General Requirements

1. Provide building attachments required for supporting mechanical work, suitably selected and installed for the loads applied with a minimum additional safety factor of 3.
2. Where specified attachments are not suitable for conditions, submit to Engineer for approval, proposal for alternate building attachments.
3. Manufacturers:
   a. Grinnell
   b. B-Line.

B. Drilled Insert Anchors:

1. Submit for approval, project specific installation drawings for all loads over 100 lbs. Insert depth shall not exceed two thirds the thickness of the concrete.
2. Anchors may be adhesive or expansion type up to 1000 lbs., and shall be adhesive type for loads over 1000 lbs.

PART 3 EXECUTION

3.1 GENERAL

A. Existing ductwork and piping shall be protected, brace and support where required for proper execution of the work.

B. Demolition of mechanical equipment shall include all existing furnaces, ductwork, piping, valves, controls, and supports where such items are not required for reuse.

C. Arrange work accordingly, providing such fittings as duct transitions traps, valves and accessories necessary to complete all construction in an orderly fashion.

D. Install all equipment in strict accordance all directions and recommendations furnished by the manufacturer.

3.2 CUTTING AND PATCHING

A. All cutting required shall be done by the contractor whose work is involved, without extra cost the Owner. All patching and restoration including the furnishing and installation of access panels in ceiling, walls; etc. Within the building lines shall be done by the respective, responsible contractor. No cutting of structural steel, concrete, or wood shall be done without prior approval and explicit directions of the Owner patched by the respective, responsible contractor.

B. The contractor, under whose jurisdiction the work may fall, shall provide labor, material, and tools required to cut, repair, protect, cap, or relocate existing pipes, conduits, or utilities interfering with or uncovered during work, per regulations of the authorities having jurisdiction.

3.3 ACCESSIBILITY

A. Do not locate traps, controls, unions, pull boxes, etc. in any system at a location that will be inaccessible after construction is completed. Maintain accessibility for all components in mechanical, electrical, and plumbing systems.

3.4 EXCAVATION AND BACKFILL

A. Excavation and removal of material, shoring, dewatering, and backfilling required for the proper laying of all pipes and conduits inside the building and premises, and outside as may be necessary, shall be done by the contractor whose work is involved, without extra cost to the Owner.

3.5 ROUGH-IN FOR CONNECTION TO EQUIPMENT

A. It shall be the responsibility of each contractor to study the drawings, conferring with the various trades involved and checking with the supplier of equipment in order to properly rough-in for all equipment.

3.6 MATERIAL AND EQUIPMENT

A. All material and equipment shall be new and of the best quality, and shall be the standard product of reputable manufacturers. The material and equipment must meet approval of state and local codes in the area it is being used. Roof decks shall not be used to support piping, conduit, equipment, devices, etc.

3.7 SEAL PENETRATIONS

A. Seal the space around pipes in sleeves and around duct openings through walls, floors and ceilings. Provide adequate clearance to allow for proper sealing.

3.8 FIRE STOPPING

A. Provide UL classified fire stopping system for mechanical penetrations through rated walls and floors to maintain the fire rating.

3.9 CONTROL WIRING

A. All control wiring for mechanical and electrical equipment, including motor starters, shall be 120 volt maximum and wired with one side of the coil grounded. All control wiring shall be installed in conduit.

END OF SECTION 220500

SECTION 220519 - THERMOSTATS, GAGES AND METERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pressure gages and pressure gage taps.

B. Thermometers and thermometer wells.

1.2 SUBMITTALS

A. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

B. Project Record Documents: Record actual locations of components and instrumentation.

PART 2 PRODUCTS

2.1 PRESSURE GAGES

A. Manufacturers:

1. Dwyer Instruments
2. Omega Engineering, Inc.

B. Pressure Gages: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.

1. Case: Steel with brass bourdon tube.
2. Size: 2 inch diameter.
3. Mid-Scale Accuracy: One percent.
4. Scale: Psi.

2.2 PRESSURE GAGE TAPPINGS

A. Gage Cock: Tee or lever handle, brass for maximum 150 psi.

2.3 TEST PLUGS

A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide two (2) pressure gages per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gage.

C. Provide instruments with scale ranges selected according to service with largest appropriate scale.

D. Install gages in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

END OF SECTION 220519

SECTION 220719 - MECHANICAL SYSTEMS INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Piping insulation

B. Jackets and accessories

1.2 SUBMITTALS

A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.4 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.

2.2 FIBERGLASS

A. Manufacturers:

1. Knauf Insulation
2. Johns Manville
3. Owens Corning

B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.

1. 'K' value: ASTM C177, 0.24 at 75 degrees F.
2. Maximum service temperature: 850 degrees F.
3. Maximum moisture absorption: 0.2 percent by volume.
4. Density: 3.5 lb/cu. ft

C. Vapor Barrier Jacket:

1. White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E 96 of 0.02 perm-inches.

D. Tie Wire:

1. 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

E. Vapor Barrier Lap Adhesive:

1. Vapor Barrier Lap Adhesive shall be compatible with the insulation and as recommended by the insulation manufacturer

F. Insulating Cement/Mastic:

1. ASTM C195; hydraulic setting on mineral wool.

G. Fibrous Glass Fabric:

1. Cloth: Untreated; 9 oz/sq yd weight.
2. Blanket: 1.0 lb/cu ft density.
3. Weave: 5x5.

H. Indoor Vapor Barrier Finish:

1. Vinyl emulsion type acrylic, compatible with insulation, white color.

2.3 JACKETS

A. PVC Plastic.

1. Manufacturers:
   a. Johns Manville Corporation; Model 2000: www.jm.com.
   b. Protto
   c. Ceelco
2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
   a. Minimum Service Temperature: 0 degrees F.
   b. Maximum Service Temperature: 150 degrees F.
   c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
   d. Thickness: 10 mil.
   e. Connections: Brush on welding adhesive.

B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.

1. Thickness: 0.016 inch sheet.
2. Finish: Smooth.
3. Joining: Longitudinal slip joints and 2 inch laps.
4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
6. Provide Aluminum Jacket on all exterior piping.

PART 3 EXECUTION

3.1 EXAMINATION/PREPARATION

A. All piping must be inspected, tested and cleaned prior to insulation materials being applied.

3.2 INSTALLATION

A. Insulation shall be installed in accordance with manufacturer's instructions and/or NAIMA National Insulation Standards.

B. Exposed Piping: Locate insulation and cover seams in least visible locations.

C. Glass fiber insulated pipes conveying fluids below ambient temperature:

1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

D. Glass fiber insulated pipes conveying fluids above ambient temperature:

1. Provide standard jackets, with vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

E. Inserts and Shields:

1. Application: Piping 1-1/2 inches diameter or larger.
2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
3. Insert location: Between support shield and piping and under the finish jacket.
4. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
5. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

F. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.

G. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier

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A	REVIEW	7/22/14
△	*REVISION*	*DATE*

PLOT DATE: 08/21/2014 9:30 AM
DRAWN BY: S. JONES
REVIEWED BY: D. NIETHAMMER
PROJECT MANAGER: D. NIETHAMMER
FILE:

AAHC GEOTHERMAL
ANN ARBOR, MICHIGAN

SPECIFICATIONS

MECHANICAL

SPECIFICATIONS

PROJ. NO.:
SP1.0 *SHEET NO.*
B *REV*