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230500 GENERAL DESCRIPTION AND SCOPE - HVAC (HVAC)

1.0 GENERAL DESCRIPTION

These plans and specifications cover furnishing and installing all equipment, materials, transportation and labor to provide complete and operative heating, ventilating and air-conditioning systems for the renovation and conversion of the Peekskill Firehouse to a commercial kitchen incubator.

Included also are specific detailed instructions as may be later issued by the engineer.

2.0 SCOPE

The entire installation shall consist of but not be limited to furnishing and installation of the following:

Complete ventilating system.

Dampers, diffusers and louvers.

Breeching from gas-fired water heater.

Electrical connections.

Thermostats, zone valves and wiring for control systems including furnishing control devices.

Ventilation exhaust fans and ductwork.

Painting.

Cutting, patching, painting and boxing in of piping, wiring and components.

Testing and rendering operative of all new systems.

Meeting of all codes and ordinances.

Coordination with utility company, meeting inspection requirements and payments of all fees.

230505 GENERAL CONDITIONS - HVAC (HVAC)

1.0 GOVERNING CONDITIONS

Governing Conditions of the Heating, Ventilating and Air-Conditioning Contract shall be in accordance with all provisions of the Bid Documents, Contract Documents, Specifications and Supplementary General Conditions, including "Standard General Conditions of the Construction Contract" (NSPE/ACED-56465, latest edition) and/or "General Conditions of the Contract for Construction" (AIA Document A201, latest edition).

Supplementary General Conditions may be provided for all mechanical work and are contained in the General Construction Documents. This contractor should read and understand these conditions.

2.0 DRAWINGS, SPECIFICATIONS, BID DOCUMENTS

System layout and details shown on drawings - HVAC series. Scale as noted. Do not scale drawings. Refer to architectural drawings for actual dimensions. Follow drawings as far as practical and supplement by actual field conditions.

All work within this Section shall be subject to all provisions of the bidding documents, contract documents, specifications and all Supplementary General Conditions thereto.

Provide all labor, materials, equipment, apparatus, tools, services, appliances, plant, permanent and temporary facilities required in performing all operations necessary for the complete installation of heating, ventilating and air conditioning facilities as called for within this Section of the specifications and drawings.

Provisions within this Section of the specifications are complementary to all other Sections of the specifications, to the drawings, and to the site and job conditioning.

It is the intention that these specifications, and drawings accompanying same, shall provide for the furnishing and installing of the heating, ventilating and air-conditioning systems complete as specified and shown. Any work shown on the drawings and not particularly described in the specifications or vice versa, or any work changes which may be evidently necessary to complete the installation shall be furnished by this contractor.

3.0 SHOP DRAWINGS AND APPROVALS

Furnish shop drawings for all major items of equipment. Items requiring shop drawings:

Air-conditioning components

Ductwork - new and alterations to existing

Diffusers and grilles

Temperature Control system

Pumps

Exhaust Fans

Submit six copies of shop drawings for approval and cuts of all equipment and appliances prior to start any work. No items of equipment will be permitted on the site until this approval has been given. HVAC contractor shall allow ample time for checking and processing and shall assume responsibility for delays incurred due to rejected items.

4.0 WORKMANSHIP

Provide neat, mechanical appearance. Provide minor alterations to suit job conditions to accomplish. Special attention shall be given to headroom requirements where ducts and piping are exposed.

5.0 MATERIALS

Provide best-accepted industry standard equipment as per manufacturer and catalog numbers shown. Piping materials shall meet ASME test codes. Cooling equipment ratings should be per ARI standards. All equipment shall be new and corrosion protected.

6.0 GUARANTEE

Contractor shall guarantee all workmanship, materials and correct operation for a period of one year and shall repair promptly any leaks or breakdowns during that period. Where specific items have greater manufacturer's guarantee period, this guarantee is in addition to manufacturer's liability. Guarantee shall be in writing to the Owner. All air conditioning compressors shall be guaranteed for five years. The contractor shall promptly correct any defects upon notice from the owner to do so, without cost to the owner.

7.0 CODES, PERMITS AND INSPECTIONS

Comply with all building code requirements of New York State Building Code, National Electrical Code, NFPA, and all applicable Federal, State and Municipal laws, ordinances and regulations. This contractor shall apply for and obtain all required permits and inspections and pay all fees.

8.0 DUCTS AND HANGERS

Provide all duct work for the various heating and ventilating systems complete in every respect and ready to operate.

Material shall be galvanized sheet, ASTM A-653 / A653M. All galvanized steel ducts shall be of gauges shown on drawings and as follows:

Round	Rectangular Greatest Dimension	Gauge
0" - 8	0" - 12"	26
9" - 12"	13" - 30"	24

Over 12" Over 30" 22

All rectangular ducts shall be crossbroken.

Methods of construction and metal gauges shall be as set forth in SMACNA guide (latest edition). All ducts shall be straight and smooth on the inside and neatly finished joints. Slip joints shall be used in the direction of the airflow.

All duct joints shall be sealed using liquid duct sealant and wrap joints with duct tape.

Ducts shall be securely supported in approved manner, and so constructed and installed as to be free from vibration, "panting" or "oil canning" under all operating conditions, especially on startup and shutting down.

Horizontal ducts shall be suspended by galvanized bond iron hangers on 3" centers from joints, angle irons or floor slabs. Each hanger band shall run completely across bottom of duct and be supported at each floor level by approved angle iron supports.

Where space permits, duct elbows shall have a centerline radius 1-1/2 times the dimensions of the duct in the plane of the bend. Where space does not permit, the minimum radius of 1.25 may be used without concentric splitters or square elbows with turning vanes similar to Tuttle and Bailey "Ducturns" or approved equal. When concentric splitters are used, the radius of the bends shall be carefully located for low loss elbows.

All branch ducts and outlets not equipped with adjustable louvered registers or volume control devices shall be equipped with volume dampers. (Accessible).

Approved access doors shall be located on ducts and housing for cleaning and maintenance of ducts, dampers, damper operators and equipment not otherwise accessible.

All ducts 36"-45" wide shall be reinforced by 1" x 1" x 1/8" angles on 4'-0" on centers.

Ductwork shall present neat workmanlike appearance, straight and plumb or level as location requires. Set openings symmetrically across walls, located to comply with architectural details.

Provide fire dampers where shown and/or required. Construct in accordance with NBFU Bulletin No. 90 (latest edition).

Provide double thick 14 oz cotton canvas connections wherever ductwork adjoins air-moving equipment. Minimum 4" separation.

The inside of all ductwork where visible through openings shall be painted with two prime coats of flat black paint.

9.0 INSULATION

- 9.1 All supply and return air ductwork shall be externally insulated with minimum R-6 (installed value) fiberglass insulation when located inside the building envelope in unconditioned spaces and R-8 (installed value) when located outside the building envelope. Insulation shall have reinforced foil Kraft facing and be adhered to ducts by 4" strips of bonding adhesive on 8" centers. All joints shall butt together and be sealed with 2" flaps. Materials shall be Owens-Corning RFK-75 or approved equal.
- 9.2 Acoustic duct liner shall be 1" thick fiberglass board with fire-resistant resin coating. Liner shall be adhered by cementing with mechanical fasteners. Materials shall be Owens-Corning Duct Liner Board or approved equal. Insulation shall be applied where directed and shown on drawings.
- 9.3 Vibration Isolation: All motorized equipment shall be insulated with approved vibration eliminator.
- 9.4 All piping to be insulated in accordance with the New York State Energy Conservation Construction Code, latest edition.

10.0 OPENINGS, CHASES, CUTTING AND PATCHING, CLEANUP

General Contractor shall provide all openings, chases, and recesses necessary for this work. HVAC Contractor shall be responsible for furnishing all necessary information to General Contractor, such as locations and sizes, in ample time prior to installation of their work.

Furnish the GC with sleeves, inserts, etc. ahead of the general construction work so that they may be installed by them. Supervise the placing of these items.

In no case may floor or walls that are waterproofed be cut for admission of any equipment nor any structural member be pierced without written permission of the (architect, engineer, owner). All cutting and patching of existing or installed construction shall be by HVAC contractor.

HVAC contractor shall do all cutting and patching of their work which may be required to make various parts come together properly and fit it to receive or be received by work of other contractors as shown or reasonably implied by the contract drawings and specifications for completed work; and, they shall make good after them as the architect may direct.

Any additional costs caused by defective or ill-timed work by the HVAC contractor shall be borne by them.

HVAC contractor shall not endanger any work by cutting, excavating or otherwise altering the work and shall not cut or alter the work of any other contractor save with written permission of the architect.

HVAC contractor shall at all times keep all areas void of packing, rubbish, etc., and shall clean up project as soon as completed.

11.0 ACCESSIBILITY

HVAC contractor shall fully inform themselves regarding any and all peculiarities and limitations of the space available for the installation of all work and materials furnished and installed under the contract. Due care shall be exercised so that all parts of their work are made quickly and easily accessible. All concealed equipment, valves, controls, etc., provided with access doors of sufficient size and as approved by architect.

12.0 SUPPORTS

All concrete foundations for heating, ventilating and air conditioning apparatus shall be installed by this contractor. Furnish all necessary templates, anchor bolts, plates, tubes, washers, double nuts, etc., required for setting.

This contractor shall guarantee that the work as installed by them will not result in the transmission of objectionable noise or vibration to any occupied parts of the building; and, they shall take full responsibility for any necessary modifications of their equipment, or of the foundations and supports for the same necessary to secure this result.

13.0 TEMPORARY HEAT

This contractor shall furnish and install all temporary heating equipment and shall fuel and maintain same during course of project. They shall render it operative and maintain a minimum working temperature throughout the building of 55 degrees F. This contractor shall read and thoroughly understand this Section and their participation in the requirement of temporary heating.

This contractor shall NOT use permanent heating equipment for temporary heat until same is accepted by owner.

14.0 PROTECTION OF APPARATUS

All pipe and duct openings shall be protected by temporary covers to exclude entrance of debris or other foreign matter during construction. All equipment shall be properly protected from damage during the course of building construction.

15.0 ACCESS DOORS AND PANELS

Furnish and install flush type access doors or panels with metal frame to permit access to control dampers, valves, devices, fire dampers, etc. Furnish insulated duct access panels for access to devices within ducts.

16.0 MECHANICAL IDENTIFICATION

All piping and equipment shall be labeled with industry standard labels and stamps.

230510 SUPPLEMENTAL GENERAL CONDITIONS (HVAC)

1.0 CONTRACTUAL RELATIONSHIP WITH OWNER

Upon award of this contract, the contractor shall save harmless the owner and their agents from any or all causes of action arising out of the contractor's negligence.

2.0 O.S.H.A.

All work on this project shall be accomplished in accordance with Federal Statutes such as the Occupational Safety and Health Act (1970).

3.0 OTHER GENERAL CONDITIONS

3.1 Intent - It is the intent of these plans and specifications to provide alterations and/or new construction as indicated on the drawings and in the specifications to provide complete new systems in every respect, capable of operating as designed. It is not intended that every fitting, minor detail or feature be shown on drawings.

The contractor shall be responsible for any detail necessary for completion of these systems in accordance with good practice.

Installation shall be executed so as to contribute to efficiency of operation, minimum maintenance, accessibility and sightliness. The installation shall conform and accommodate itself to the building structure, its equipment and its usage. No piping or equipment shall be installed in such a manner as to interfere with the operation of any doors or windows.

Requirements specified herein shall govern applicable portions of mechanical and electrical sections whether so stated herein or not.

3.2 Regulations and Certificates - All work shall be done in strict accordance with rules and regulations of local and state authorities having jurisdiction over such work, utility companies operating where apparatus is being installed, National Fire Protection Association, IEEE and insurance companies. Where discrepancies occur between above regulations and these plans and specifications, requirements of the regulations shall take precedence, except that these specifications shall be minimum requirements and that no changes shall be made without approval of the engineer.

Complete approval of all above mentioned authorities shall be secured and their certificates of approval shall be delivered to the owner before final acceptance. Any and all drawings or documents required (in addition to contract drawings) shall be furnished in order to secure above-mentioned approvals.

3.3 Drawings and Measurements - Contract drawings for mechanical and electrical work are in part diagrammatic, intended to cover the general design and extent of the systems and

indicate general arrangement of equipment, ducts, conduits, piping and approximate sizes and locations of equipment and outlets.

Drawings are not intended to be scaled for roughing-in measurements nor to serve as shop drawings. Where drawings are required for these purposes or have to be made from field measurements, they shall be prepared by the various trades and coordinated by the contractor.

Where job conditions require reasonable changes from indicated locations and arrangements, such changes shall be made without cost to the owner.

Exact locations of all grilles, registers, plumbing fixtures, electrical fixtures, panelboards, etc., shall be governed by plans, elevations and details.

- 3.4 Record Drawings - During the course of construction the respective contractor shall keep a careful record (in drawing form) of all deviations from the work as shown on the contract drawings on the installation of pipes, ducts, electric outlets, equipment, invert elevations, etc. These drawings shall be delivered to the engineer before the final certificate of payment is issued.
- 3.5 Accessibility - Locate all equipment which must be serviced, operated or maintained, in fully accessible position. Equipment shall include but not be limited to valves, traps, cleanouts, motors, controllers, drain points, etc. Furnish access doors where required. Minor deviations from the drawings may be made to allow for better accessibility, but changes of magnitude or which involve extra cost shall not be made without approval.
- 3.6 Access Doors and Panels - Furnish flush type door or panel with metal frame for all dampers, valves, cleanouts or apparatus located in chases, walls or floors. Finish shall be prime coat.
- 3.7 Quiet Operation - All equipment shall operate under all conditions of load without any sound or vibration which is objectionable to the opinion of the engineer. In case of moving machinery, sound or vibration noticeable outside of room in which it is installed or annoyingly noticeable inside its own room will be considered objectionable. Sound or vibration conditions considered objectionable by the engineer shall be corrected in approved manner by the contractor at the latter's expense.
- 3.8 Covering of Work - No pipe fittings or other work of any kind shall be covered up or hidden from view before it has been examined or approved by the engineer or other authority having jurisdiction. Any unfaithful or imperfect work or material which may be discovered shall be removed and corrected immediately before being condemned, and other work and materials shall be furnished which shall be satisfactory to the engineer.
- 3.9 Waterproofing - Where any work pierces waterproofing, the installation shall be as approved by the engineer. Contractor shall furnish all necessary sleeves, caulking and flashing as required to make the openings absolutely watertight.

3.10 Excavation and Backfill - All excavation and backfill shall be by the contractor who is furnishing and installing the respective equipment. Cleanup, resurface and resod all disturbed areas.

3.11 Site Conditions - Prior to bid submission, this contractor shall familiarize themselves with the site and understand all the conditions under which they will be obligated to operate in performing their part of the contract. No allowance will be subsequently made in this connection to this contract or for any errors through omission or negligence on their part.

4.0 FIRESTOPPING

All penetrations through fire and smoke rated walls, floors, and ceilings shall be thoroughly sealed with 3M Brand Fire Barrier CP25WB latex based caulk, or approved equal. Install in accordance with manufacturer's instructions.

5.0 EQUIPMENT RETURNS

As part of this contract, contractors shall ensure that suppliers of any and all equipment supplied for this project agree to accept the return of any equipment on this project that is in undamaged condition and has not been put into service with a maximum restocking fee of 25%, up until the date of certified substantial completion of the project.

6.0 COORDINATION OF TRADES

It is understood that coordination between all of the trades on this project is the responsibility of the construction manager (if any), the general contractor (if any) and the trades themselves. This coordination will include meetings and discussions as needed among the parties noted above, and preparation of coordination drawings as needed. The cost of this coordination work shall be included in the contractors' bids. It is not the responsibility of the engineer to perform this coordination. No extra charges will be paid to any contractor that is due to additional work being performed due to lack of coordination between the trades.

7.0 BUILDING SERVICES SHUTDOWNS

All building services shutdowns, including electric, gas, water, and telephone utilities, and HVAC, sprinkler, and plumbing systems in existing buildings, for the purpose of performing cutovers and tie-ins of new systems, shall be strictly coordinated with the appropriate utility companies and the building owner. For work in existing buildings, it will be required to perform this work outside of normal building operation hours and the cost for this is to be included in the bids.

230593 SYSTEM TESTING, ADJUSTMENT AND OPERATION (HVAC)

1.0 TESTING

Render all equipment operative. Check system for proper operation. Run all equipment long enough to dry out and test all controls for proper operation and operation of all safety controls.

2.0 ADJUSTMENT AND BALANCING

Operate all equipment on cooling cycles and balance volume dampers on all ducts and registers to effect comfort and proper cfm. All testing and balancing shall be performed by a Certified HVAC Testing and Balancing Contractor at responsibility of HVAC Contractor.

HVAC Contractor to provide Certified HVAC Test and Balance Report for Engineer's review and approval. HVAC Test and Balance must meet the satisfaction of the Engineer. Approved Test and Balance Report shall be provided to Code Enforcement Agent upon request.

3.0 OPERATING INSTRUCTIONS

Furnish, frame and post all operating instructions for all HVAC/Plumbing equipment on project.

4.0 CONTRACT CLOSE OUT

4.1 In the presence of the owner, engineer or architect; demonstrating operation of systems and that all specifications have been met to the satisfaction of all parties.

4.2 Provide required spare parts, devices and appurtenances.

4.3 Provide 2 copies of O & M manuals, shop drawings and catalog cuts, bound in 3 ring binder or similar.

4.4 Demonstrate to building maintenance personnel correct preventive maintenance and scheduled maintenance services.

4.5 Provide warranties to owner, including points of contact for warranty work for system installation and manufacturers equipment installed.

Final payment will not be released until contract closeout is complete.

**230900 ELECTRICAL CONNECTIONS TO HVAC AND PLUMBING EQUIPMENT
(HVAC) (P)**

1.0 DESCRIPTION

The electrical contractor shall furnish all power wiring to and including disconnect switches and equipment. Wire complete and render operative. All wiring per National Electrical Code (latest edition), state and local codes.

The electrical portion of the project shall consist of but not be limited to:

1. Extension of power circuits at 120/208 or 120/240 volts from existing panels to water heater, circulators, etc.
2. Extension of 120/208 or 120/240 volt circuits to controls transformers.
3. Furnish and install overcurrent devices and disconnect switches.
4. Connection of units and rendering except in boiler rooms.

All wiring shall be concealed except in boiler rooms.

2.0 CONTROL WIRING

Responsibility to provide control wiring by respective (HVAC or plumbing) contractors who shall hire licensed electrician to install same. All control wiring shall be per standards of National Electrical Code and local requirements.

Control wiring shall consist of but not be limited to:

1. Thermostat wiring, sail switches, temperature sensors, etc.
2. Low voltage wiring to circulator relay.
3. Wiring of aquastats, pressure switches, flow switches, etc.
4. Control transformer installations.

All control wiring shall be concealed, except in boiler rooms.

Assist electrical contractor in testing power wiring including all motors for phase rotation and starter function. Check all heating elements.

Respective contractors shall be responsible for correct wiring of their equipment and shall provide magnetic starters and thermal protection as required.

Connect and test all control wiring for function and accurate control. Check all safety and limit switches. Contractor shall not operate any equipment above thermal or pressure ratings for tests.

Provide electrical operating instructions as required.

Respective contractor indicated above refers to the contractor responsible for providing said equipment under this contract which requires control.

3.0 MOTOR STARTERS AND CONTROLLERS

Starters shall be provided by respective contractor (HVAC or plumbing) for all motors provided by respective contractor. Starters shall be as follows, unless provided as a part of packaged equipment or noted otherwise elsewhere. All starters shall be standard NEMA sizes and be UL-listed. Starters for indoor locations shall have NEMA 1 enclosure. Starters for outdoor locations shall have NEMA 3R enclosure. Where motors will operate at a different temperature than the starters serving them provide ambient compensated overload relays. Furnish overload heaters sized for the nameplate running amperes of the motor protected.

For all three-phase motors furnish a magnetic combination starter with fusible disconnect switch, Hand-Off-Auto switch and red "run" pilot light on cover, integral 120V secondary control transformer with dual primary fusing and a fuse in the hot secondary leg, one normally open auxiliary contact and a NEMA class 20 three-phase overload relay. For starters with external control voltages furnish an auxiliary contact on the disconnect switch to disconnect the external voltage source when the disconnect switch is off.

Three-phase two-speed motors shall be provided with a combination magnetic starter as specified herein with the following exceptions: provide a High-Off-Low-Auto cover switch in lieu of a Hand- Off-Auto cover switch, high and low speed contractors must be electrically and mechanically interlocked to prevent simultaneous pull in and provide a low-speed compelling relay and a deceleration relay factory wired in starter enclosure.

For all single-phase motors one half horsepower and larger, furnish a single-phase magnetic combination starter with non-fusible disconnect switch and red run pilot light on its cover, integral 120V secondary control transformer with dual primary fusing and a fuse in the hot secondary leg, one normally open auxiliary contact and a NEMA class 20 overload relay. If primary voltage is 120V an integral control transformer is not required, however starter control voltage shall be taken from the primary voltage and fused for the ampacity of the control conductors. For all single-phase motors under one-half horsepower, electrical contractor shall furnish a manual thermal starter with overload protection, stainless steel cover plate and run pilot light. Fuses shall be provided with starters.

For equipment operated for smoke and fire control and egress, or other life safety equipment provide a Hand-Auto cover switch in lieu of a Hand-Off-Auto cover switch. The disconnect switch for life safety equipment should be left padlocked in the "on" position. For equipment which must never be run continuously due to safety considerations (for example air compressors,

fuel pumps) provide an Off-Auto cover switch in lieu of a Hand-Off-Auto switch.

All safety devices shall be wired so that they stop the motor with the Hand-Auto switch in the Hand as well as the Auto position. This will normally mean breaking the common wire from the Hand-Off-Auto switch to the starter's holding coil through the safety devices.

The contractor will protect starters from the weather at all times before they are installed. The cover will be kept closed at all times during construction on all starters except when someone is working within the enclosure. All starters will be located indoors unless indicated otherwise elsewhere.

No excess capacity is provided on control transformers. Do not run control motors from starter control transformers. Control power capacity required for the automatic controls shall be provided by the control subcontractor.

4.0 ELECTRICAL WIRING STANDARDS

All electrical work required to be furnished and installed under this section of the specifications shall be in complete accord with materials and methods of installation of the National Electrical Code.

All heating units shall be complete with disconnect switch and fuse protection.

Furnish and set all motors, dampers, thermostats, heating unit control relays, and appurtenances.

All power wiring shall be THHN copper conductors in EMT.

All low voltage wiring shall be #18 TW run as follows:

1. Unfinished Areas - exposed in EMT.
2. Finished Areas - Concealed.

230993 AUTOMATIC TEMPERATURE CONTROL SYSTEM (HVAC)

1.0 DESCRIPTION

Furnish and install a complete electric-electronic temperature control system as described herein and shown on drawings of control equipment as furnished by Honeywell, Inc. or approved equal.

Controls shall be installed by HVAC contractor utilizing qualified electrician under direct supervision of trained representative of the control manufacturer who shall also furnish completely engineered control wiring diagrams, written description of system operation, make all final adjustments and calibrations, guarantee all equipment and render free service for a period of one year from date of acceptance by the engineer.

Entire installation shall be furnished and installed by HVAC contractor and all wiring for control system shall be furnished and installed by HVAC contractor.

2.0 EQUIPMENT AND OPERATION

Automatic dampers furnished by control manufacturer shall be opposed bladed where they throttle airflow and parallel bladed where their operation is full open-full closed. All damper motors shall have oil-immersed gear trains. All dampers exposed to outside air shall have neoprene edges for tight shutoff.

3.0 CONTROL FUNCTIONS

Basic control functions are hereinafter described in an abridged form. This contractor shall provide the entire control systems complete and operative based on this abridged description and the information shown on drawings.

Multi-zone Unit - Provide controls as indicated on the drawings and as recommended by the manufacturer.

DOAS System - refer to the drawings for specific control sequences.

When thermostat is indexed to cooling, upon rise in space temperature, contacts shall close and operate air handler and compressor condenser unit.

Provide all safety controls as required and recommended by manufacturer.

233300 LOUVERS AND FIRE DAMPERS (HVAC)

1.0 DESCRIPTION

Furnish and install all ventilation louvers and fire dampers as shown on plans and herein described.

2.0 INSTALLATION

Louvers - Provide outside air intake and combustion air louvers. Fabricate louvers from 0.081" thick extruded aluminum with blades welded or screwed into frames. Frames shall be welded and shall have ½" mesh 16 ga. aluminum bird screen. Louvers shall be recessed, flanged, removable as noted on drawings. Anchor securely into openings. Louvers shall be Penn Ventilator, Vent Products, Titus, Carnes, Ruskin, Air Control Products or Krueger. No other manufacturers are approved.

Fire Dampers - Provide fire dampers at penetrations of fire rated walls, floors and ceilings, at ducts, registers, grilles or louvers as indicated on drawings or otherwise required by local codes and state fire authorities. Fire damper installation shall conform to details shown in SMACNA Fire Damper Guide and as required by local codes. Each fire damper shall have access panel for maintenance and inspection. Locate access panels not more than 6" from fire damper they serve. Construct dampers to conform to UL and NFPA requirements and bear UL label. Dampers shall be approved by State Fire Authorities where required.

Leave six fusible links of each rating type used on project with building engineer.

233423 VENTILATION - EXHAUST FANS AND SYSTEMS (HVAC)

1.0 DESCRIPTION

This contractor shall furnish and install complete and operative, several exhaust fans and exhaust systems consisting of fans, housings, curbs, frames, ductwork, grilles, louvers, insulation, electrical controls and appurtenances to render the systems completely operative as per drawings and specifications.

2.0 EQUIPMENT AND INSTALLATION

This contractor shall furnish and install exhaust fans in various locations shown, including but not limited to: all toilet rooms, shops, offices and other locations shown. See plans for technical data on various exhaust system components in the several areas shown.

Some fans shown shall be roof mounted. This contractor shall furnish and install entire fan system complete and operative including fan, housing, motor operated louver curb and exhaust grille.

Wall mounted fans shall be furnished and installed complete and back draft damper, gasketing and flashing for watertightness.

Exhaust fans and relief vents - Ventilator housing shall be aluminum construction completely weatherproofed and hinged, aluminum mesh ½" bird screen angle frame stiffeners.

Centrifugal wheels shall be backwardly inclined and non-overloading type. All two-speed motors shall be two winding.

Provide UL approved non-fused disconnects for all fans, mounted in housing.

Provide back draft dampers and operators on all fans.

Roof and wall exhausters shall be Penn Ventilator Co., or approved equal.

Provide 12" high all aluminum curb, prefabricated, with built-in canting all around and 1" insulation board. Furnish sound curbs as shown. Insulate curbing, for sound attenuation as directed on plans.

Furnish all starters, controllers and control system as part of this contract.

Provide vents in locations, sizes and capacities as shown on plans and drawings. Vents shall be Penn Ventilator, Co. or equal.

All fans shall be equipped with insect and bird screens.

All exhaust fans and systems shall be controlled as shown on plans.

Operation - Manual control except as herein described.

Ventilating housing shall be aluminum construction completely weather tight with aluminum mesh 1/2" bird screen.

233813 KITCHEN EXHAUST FANS AND HOODS (HVAC)

1.0 DESCRIPTION

Furnish and install all kitchen ventilation and exhaust fans shown on plans and herein described.

2.0 INSTALLATION

Fans shall be located as shown. Furnish and install entire fan system complete and operative including fan, housing, kitchen hood, lights and controls.

All fans shall be quiet operation.

Entire installation shall be in accordance with NFPA 96. Manufacturer shall be Gaylord, Kees or approved equal.

Material shall be brushed stainless steel for exposed installations. Ductwork not exposed may be carbon steel.

3.0 FIRE SUPPRESSION

Install pre-manufactured kitchen hood extinguishing system, as described or shown on accompany drawings. System shall be mfg. by Ansul, Pike or approved equal.

4.0 ELECTRICAL INSTALLATION

Provide an install all on/off and remote control switches. Hire electrical contractor to perform work required to be performed by a licensed electrician.

237413 AIR HANDLING AND COOLING SYSTEMS & EQUIPMENT (HVAC)

1.0 DESCRIPTION

Heating, ventilating and air conditioning systems for this project shall consist of various electrically fueled systems as hereinbefore described in the General Description, detailed on plans hereinafter described.

2.0 EQUIPMENT

Furnish and install equipment as shown on drawings. All component package units shall be factory-assembled, completed and tested.

Cooling Equipment - Compressor condenser units shall be as hereinafter described and as further described on plans.

Condenser Coil - Coil to be constructed of ripple-edged aluminum fins machine flat fitted to seamless copper tubes for maximum strength and contact area. Each joint silver soldered. Pressure leak tested at 450 to 500 psi. Horizontal coil mounting permits self-cleaning from rain and also provides quick and easy access for cleaning by other means when required. Removal of fan assembly and air grille allows complete access to both sides of the coil.

Condenser Air Movement - The condenser air compartment contains only the necessary components for air moving. This permits straight through and upward discharge of air resulting in minimum restriction and extremely quiet operation. Direct drive fan is equipped with a totally enclosed and moisture proof motor. Heavy gauge galvanized steel fan guard is furnished as standard. Fan, motor and guard are attached together in one complete assembly and resiliently mounted in the unit. Slot mounting allows quick, easy removal and replacement of the entire fan assembly for service.

Compressor - Resiliently mounted and in addition the entire running gear assembly is spring mounted within the sealed can. 1-1/2 thru 3-ton compressors have internal overload protection and internal automatic resetting high-pressure relief. 3-1/2, 4 and 5-ton compressors have external high-pressure control, external overload and protection and crankcase heaters. All compressors shall carry full five-year warranty.

Motor and Fan Assembly - Shall be mounted on a one-piece galvanized steel motor board which shall be easily removable for maintenance without breaking pipe connections or rewiring. Fans shall be aluminum double inlet, forward curved and centrifugal type, direct connected to a two-speed PSC motor with built in automatic reset overload protection.

Control Box - Shall be complete factory prewired with plug-in connections for heating section and cooling chassis, and with adequately sized junction box for wiring of external power supply and temperature controls.

Sheathed Electric Heating Coil - Shall consist of electric resistance wires encased in copper plated finned steel sheath.

3.0 SUPPLY AND RETURN AIR

Furnish and install a complete ducted system to required space. Entire duct system shall have net inside dimensions as shown on plans. All ducts shall be externally insulated as shown and described herein.

4.0 GRILLES, REGISTERS, DIFFUSERS

See drawings for sizes, manufacturer, catalog numbers.

Provide and connect with ductwork in an approved manner all registers and grilles and diffusers shown on drawings. The exact locations of all registers and grilles shall be obtained from the architectural drawings. The right is reserved to vary the location of any register, grille or diffuser to a reasonable extent without extra cost to the owner.

5.0 FILTERS

This contractor shall furnish and install proper filters on all package air-conditioning units and air-handling units. Filters shall be left in units at all times during installation. The filters shall be changed to new filters in each unit upon completion of project upon acceptance by owner and approval of engineer.

6.0 INSULATION

This contractor shall provide all insulation for thermal and acoustical purposes on all ducts and equipment as follows or as indicated on drawings. Insulation shall be Knauf, Owens Corning or approved equal. All dimensions are net internal measurements.

All work shall be performed in strict accordance with the best practices of the trade, recommendations of the manufacturer and the intent of this specification. All supply and return air ducts, including all branches, risers, take offs, etc., insulated with minimum R-6 (installed value) when located inside the building envelope in unconditioned spaces and R-8 (installed value) when located outside the building envelope. Insulation shall be fiberglass with foil kraft facing.

Insulated ductwork as follows-

1. Provide insulation with vapor barrier jackets.
2. Finish with tape and vapor barrier jacket.
3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

Ductwork Exposed in Mechanical Equipment Rooms or Finished Spaces- Finish with canvas jacket sized for finish painting.

Exterior ducting (excluding kitchen exhaust) - Provide insulation with vapor barrier jacket. Cover with caulked aluminum jacket with seams located on bottom side of horizontal duct section.

External Duct Insulation Application -

1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
2. Secure insulation without vapor barrier with staples, tape, or wires.
3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

Duct Line Application (where indicated on drawings)

1. Adhere insulation with adhesive for 100 percent coverage.
2. Secure insulation with mechanical liner fasteners. Refer to SMACNA Standards for spacing.
3. Seal and smooth joints. Seal and cost transverse joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for airflow. Increase duct size to allow for insulation thickness.

239000 SEQUENCE OF CONTRACT WORK (HVAC, P)

1.0 DESCRIPTION

This project work shall be subject to strict coordination of all trades to permit completely normal operations of this facility throughout the construction of the new addition and the reconstruction of the existing facility.

Sequencing shall consist of the following or variations thereof:

1. Removals and alterations in the existing building.
2. Install new systems as indicated.
3. Render systems operative.

2.0 CONTRACTOR WORK PHASING

This contractor shall phase all work to meet the foregoing conditions of the project work. Said phasing shall require, but not be limited to the following:

1. Temporary relocation of all mechanical and electrical components to permit construction of additions (i.e. HVAC & Electrical).
2. Installation of new electric, telephone and communication services and rendering same operative to new and existing systems.
3. Installation of new HVAC systems.
4. Installation of new plumbing facilities and interconnections.
5. Rendering operative of new and keeping existing area in operation.
6. Alterations and all new work in existing building.
7. Removal of specified services and equipment in existing building.